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POLLUTION OF LAKE MICHIGAN AND ITS TRIBUTARY BASIN. PROCEEDINGS OF CONFERENCE, SESSION (3rd) (RECONVENED) HELD AT CHICAGO, ILLINOIS, ON MARCH 24-25, 1971. VOLUME 2

Environmental Protection Agency
Washington, D.C.

1971

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PROCEEDINGS

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MICHIGAN
WISCONSIN
MICHIGAN
ILLINOIS
INDIANA

Third Session
(Reconvened)
March 24, 25, 1971
Chicago, Illinois
Volume 2

CONFERENCE

In the Matter of Pollution of Lake Michigan and its Tributary Basin

ENVIRONMENTAL PROTECTION AGENCY ● WATER QUALITY OFFICE

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RECONVENING OF THE THIRD SESSION OF THE CONFERENCE IN THE MATTER OF POLLUTION OF LAKE MICHIGAN AND ITS TRIBUTARY BASIN IN THE STATES OF WISCONSIN, ILLINOIS, INDIANA, AND MICHIGAN - - VOLUME II

Grand Ballroom
Sherman House
Chicago, Illinois
March 24, 1971

CONTENTS

	Page
Opening Statement - Murray Stein	267
Hon. Carl L. Klein	268
David D. Comey	282
Mrs. Catherine T. Quigg	291
Mrs. Jay Heyman	294
Mrs. J. Barton Kalish	297
Harry V. Bierma	301
Paul S. Goodman (Read by Charles Riefstahl)	303
Mrs. Eileen L. Johnston	310
Miss Edith M. McKee	324
Dr. John K. Langum	354
Enrico F. Conti	421
Michael E. Bialas	423
Mrs. Miriam G. Dahl	431
Mrs. Claire L. Palmer	438
Mrs. Robert Erickson	440
Mrs. Carole Magnus (Read by Mrs. Lee Botts)	457
Mrs. Kathleen Nixon (Read by Mrs. Lee Botts)	463
Thomas B. Roos	480
Mrs. Mary Helen Dunlop	483
Alexander Polikoff	484
Priscilla Zlatoff-Mirsky	487a
Charles A. Bane	489
Sol Burstein	522

CONTENTS, Continued

	Page
John R. Brough (Read by Robert G. Mowers)	539
Robert M. Kopper	548
T. A. Miskimen	563
James B. Henry	573
O. K. Petersen	582
Paul Keshishian	600

>The report is my

Reconvening of the Third Session of the Conference in the Matter of Pollution of Lake Michigan and Its Tributary Basin, in the States of Wisconsin, Illinois, Indiana, and Michigan, held in the Grand Ballroom of the Sherman House, Chicago, Illinois, on Wednesday, March 24, 1971, at 9:30 a.m.

[illegible] recommendations [illegible] Water quality standards [illegible] cooling [illegible] towers,

- - -

PRESIDING:

Murray Stein, Assistant Commissioner for Enforcement and Standards Compliance, Water Quality Office, U.S. Environmental Protection Agency, Washington, D.C.

- - -

CONFEREES:

RALPH W. PURDY, Executive Secretary, Michigan Water Resources Commission, Lansing, Michigan.

PERRY A. MILLER, Assistant Director, Stream Pollution Control Board, Indiana State Board of Health, Indianapolis, Indiana.

FRANCIS T. MAYO, Regional Director, Water Quality Office, U.S. Environmental Protection Agency, Region V, Chicago, Illinois.

CONFEREES, Continued

WILLIAM L. BLASER, Director, Illinois Environmental Protection Agency, Springfield, Illinois.

DAVID P. CURRIE, Chairman, Illinois Pollution Control Board, Chicago, Illinois.

THOMAS G. FRANGOS, Administrator, Division of Environmental Protection, Wisconsin Department of Natural Resources, Madison, Wisconsin.

- - -

ALTERNATE CONFEREES:

CARLOS FETTEROLF, Water Quality Standards Appraisal, Michigan Water Resources Commission, Lansing, Michigan.

ORAL H. HERT, Director, Division of Water Pollution Control, Indianapolis, Indiana.

ROBERT P. HARTLEY, Regional Water Quality Standards Coordinator, Water Quality Office, U.S. Environmental Protection Agency, Region V, Chicago, Illinois.

DALE S. BRYSON, Deputy Director, Office of Regulatory Programs, Water Quality Office, U. S. Environmental Protection Agency, Region V, Chicago, Illinois.

ALTERNATE CONFEREES, Continued

JACOB D. DUMELLE, Member, Illinois Pollution Control Board, Chicago, Illinois.

DONALD J. MACKIE, Assistant Secretary, Division of Environmental Protection, Wisconsin Department of Natural Resources, Madison, Wisconsin.

- - -

PARTICIPANTS:

Hon. Carl L. Klein, Former Assistant Secretary of the Interior, Chicago, Illinois.

David D. Comey, Director, Environmental Research, Businessmen for the Public Interest, Chicago, Illinois.

Mrs. Catherine T. Quigg, Pollution and Environmental Problems, Palatine, Illinois.

Mrs. Jay Heyman, Citizen, Highland Park, Illinois.

Mrs. J. Barton Kalish, Citizen, Highland Park, Illinois.

Harry V. Bierma, Director and Chairman, Clean Streams Committee, Illinois Audubon Society, Berwyn, Illinois.

Paul S. Goodman, Committee on Lake Michigan Pollution, Wilmette, Illinois.

Mrs. Eileen L. Johnston, Citizen, Wilmette, Illinois.

PARTICIPANTS, Continued

Miss Edith M. McKee, C.P.G., Chief Geologist, Theodore S. Leviton Associates, Chicago, Illinois.

Dr. John K. Langum, Economic Consultant, President of Business Economics, Inc., Chicago, Illinois.

Enrico F. Conti, Assistant to the Manager for Environmental Activities, Atomic Energy Commission, Chicago, Illinois.

Michael E. Bialas, Chairman, Committee on Environment, Chicago Area Council of Liberal Churches, Chicago, Illinois.

Mrs. Miriam G. Dahl, State Division Chairman, Water Committee, Izaac Walton League, Milwaukee, Wisconsin.

Mrs. Claire L. Palmer, Citizen, Racine League of Women Voters, Racine, Wisconsin.

Mrs. Robert Erickson, North Central Audubon Council, Racine, Wisconsin.

Mrs. Carole Magnus, Secretary, Manistee County Anti-Pollution Organization, Michigan.

Mrs. Kathleen Nixon, Secretary, Mason County Anti-Pollution Action Council, Michigan.

Thomas B. Roos, Associate Professor, Dartmouth College, Hanover, New Hampshire.

Steven E. Keane, Attorney, Wisconsin Public Service Corporation, Milwaukee, Wisconsin.

PARTICIPANTS, Continued

Mrs. Mary Helen Dunlop, Chairman, Committee on Lake Michigan Pollution, Wilmette, Illinois.

Alexander Polikoff, Executive Director, Businessmen for Public Interest, Chicago, Illinois.

Charles A. Bane, Law firm of Isham, Lincoln and Beale, Counsel for Commonwealth Edison, Chicago, Illinois.

Sol Burstein, Senior Vice-President, Wisconsin Electric Power Company, Milwaukee, Wisconsin.

John R. Brough, Northwest Indiana Industrial Committee on Thermal Standards for Lake Michigan, Indiana.

Robert M. Kopper, Executive Vice-President and Chief Operating Officer, Indiana and Michigan Electric Company, Fort Wayne, Indiana.

Thomas A. Miskimen, Senior Engineer of the Environmental Engineering Division, American Electric Power Service Corporation, New York City, New York.

James B. Henry, Vice-President and General Counsel of American Electric Power Service Corporation, New York City, New York.

O. K. Petersen, Attorney, Consumers Power Company, Jackson, Michigan.

Paul Keshishian, Director of Power Production, Wisconsin Power and Light Company, Wisconsin.

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PROCEEDINGS

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MR. STEIN: Let's reconvene. We stand reconvened.

I have an announcement or two. One, Mr. Conti, the representative of the Atomic Energy Commission, asked me to correct the record in response to a question of mine. I asked him if he believed that the present or proposed plans for nuclear power should be built with once-through cooling, and then they would have a study. His answer to that question was yes, they should be built with once-through cooling.

He advises me that the position of the AEC, as contained in the statement, is that the determination would have to be made on a case-by-case basis, and I would like the record to show that Mr. Conti indicated that.

We also have a petition from several citizens in Racine, and I would like this to be made a part of the record without objection.

(The above-referred to petition follows.)

MR. STEIN: As we start this morning, it is a distinct pleasure for me to call on my former boss, the Honorable Carl L. Klein, former Assistant Secretary of the

TO THE CONFEREES AT THE FOUR STATE LAKE MICHIGAN ENFORCEMENT CONFERENCE
HELD AT CHICAGO, ILLINOIS. MARCH 23, 24, 1971.

We the undersigned deplore the introduction of nuclear power plants to the Lakes. We consider these plants a critical threat to our Lake in the form of thermal pollution.

Adoption of minimal thermal standards and closed cooling systems are potential answers.

In addition we urge the adoption of effective monitoring proceedures which should be made at the expense of the polluters. Data should be collected daily and should be public.

As a further check, an agency,independent from the power company, should have access to the instruments and reports. Qualified scientists and biologists should evaluate the data quarterly and forward these reports and evaluations to the Four-State Lake Michigan Enforcement Conference for quarterly review.

NAME	ADDRESS	TOWN	STATE	ZIP
1. Mrs O J Sosinski	3822 Wilshire DR	Racine	Wis	53402
2. Mrs. John Doister	3600 - 10th Ave.	Racine	"	"
3. Mrs. Willard Carlson	118 Steeple Chase Dr.	Racine	"	53402
4. Mrs Jack Bowden	1229 Ranayne	Racine	"	53402
5. Mrs Gaetano Bovi	1642 Carlisle Av	Racine	"	53404
6. Mrs. Walter Dahek	1817 Green St.	Racine.	"	53402
7. Mrs Mary Ann Eaton	8020 Dunkelow Rd	Franksville	"	53126
8. Paula Reiner	7030 Majestic Dr.	~~[illegible]~~ Racine	Wis	53402
9. Mrs David L Faust	6227 Spring Street	Racine	Wis	53406
10. Mrs Sharon Nelson	3608 Douglas Ave. Apt 402	Racine	Wis	53402
11. Mrs. Lewis Fella	626 Ohio	Racine	Wis	53405
12. Mrs John Whitinger	4123 Marquette Dr.	Racine	Wis	53402
13. Mrs Bob Lafond	1855 Jupiter Ave.	Racine	Wis.	53404
14 Mrs John Finneman	2145 Golf Ave.	Racine	Wisc.	53404
15. Mrs. Clarence Peterson	3608 Douglas Ave Apt 409	RACINE	Wisc.	53402
16. Mrs Lee Panyk	821 3 Mile Rd.	Racine	Wis.	53402
17. Mrs Dennis Huston	1721 Summit Ave	Racine	Wisc	53404

Please return all petitions no later than March 20, 1971. Committee must have them to present to the Conference on March 23rd. Send them to: COMMITTEE ON LAKE MICHIGAN POLLUTION, P.O. Box 583, WILMETTE ILLINOIS 60091

Interior, Mr. Klein.

STATEMENT OF THE HONORABLE CARL L. KLEIN,
FORMER ASSISTANT SECRETARY OF THE INTERIOR,
CHICAGO, ILLINOIS

MR. KLEIN: Thank you very much, Murray.

I come to you today as the former Assistant Secretary of the Interior who believed that his first job was to save Lake Michigan in the matter of priorities. Now I am a private citizen addressing you on the basis of my previous position and my knowledge therein.

There has been a great deal said in the past several years with testimony, scientific diagrams, arguments pro and con on the question of the addition of waste heat into Lake Michigan.

Too many people have been concerned about everything but the future condition of Lake Michigan. This panel, above all other items, must first concern itself with saving Lake Michigan and thereafter concern itself with the problems arising out of saving Lake Michigan.

We have been hearing the words "cooling towers" and "cooling ponds" and other ways of dispersing waste heat. Very few people have said, very few people consider that waste heat like all other wastes is and can be a resource used for good by proper utilization. We have already put the distillation wastes from the Peoria distillery into the resource category as animal food; we have turned the waste whey from cheese factories into salable usable products -- we can do the same with waste heat.

I believe that the best example of utilization of waste product was given at the December 1970 meeting of the American Association of Advancement of Science in Chicago.

Take a city of 389,000 people, next to a nuclear generating plant, such as the one at Indian Point, New York, or Zion, Illinois.

The scientist from our Oak Ridge Laboratories stated that the waste heat from the reactor could be used: 1) 60 percent of it to heat the homes of the 389,000 people in winter; and to cool those same homes in summer; 2) send a small portion of the remaining 40 percent to the sewage treatment plant, where the addition of a small amount of heated water will increase the efficiency of the plant; 3) the remainder of the 40 percent would go to a 200 acre hothouse which could raise: a) all the fresh vegetables; b) all the chicken and eggs; c) all the pork needed by a city of 389,000 people.

Last year Assistant Secretary Glasgow -- he's now former assistant also -- and I issued a policy recommendation for thermal pollution in Lake Michigan on a 1° increase basis. We were concerned with the total discharge of 60,000,000,000 gallons a day of 20° heated water, from 20 new nuclear plants. Recirculation with use of cooling towers or cooling ponds with a slight "escape hatch" was the idea. The purpose was to protect Lake Michigan and its waters, so vital to all of us. And the roof fell in.

"Lake Michigan did not need protection." -- "Heat doesn't hurt." -- "Let's try it and if something goes wrong, maybe we can correct it." -- "The cost to the consumer will go up 25 percent." Ladies and Gentlemen, Interior had heard all the arguments in a preliminary injunction hearing on the protection of Biscayne Bay from Florida Power & Light Companys' new generating stations, and several months after that preliminary hearing, the scientists for the utilities admitted that their main premises, data and conclusions were wrong.

Both Secretary Hickel and I have said from time to time that the Nation's waters belong to the people and and are usable only on the public's terms.

Lake Michigan should be usable only on the terms that are certain to protect it. I for one, either in my former official capacity or as a private citizen, cannot tolerate any attitude other than solid protection of that body of water.

Let me lay one ghost to rest.

Proper planning for cooling in advance would increase utility bills only 1 percent; proper installation at a completed plant -- without advance planning -- would increase the costs to 2 percent. The 25 percent figure is a scarecrow raised as a bugaboo by those who put their interests before the welfare of Lake Michigan.

But even our best scientific minds do not have all the answers. We have been planning, and executing without full data, without a full realization of the total impact of our actions on our environment.

Lately a new tool -- the data computer -- has put into our hands the mathematical model. It has been used to chart airline timetables, to put a man on the moon, to make industrial production more efficient. The mathematical model can also be used to set up present water quality and to project changes from planned installations.

With the help of my Deputy Assistant for Science, Dr. S. Fred Singer, and Interior's Science Advisor, Dr. Don Dunlop, we held conferences with Illinois Institute of Technology's Dr. Morton Klein -- no relation -- FWQA's Jaworski and with representatives from University of

Oklahoma, Harvard, Cornell, University of California, and others.

The Illinois Institute of Technology research institute project is especially noteworthy since it deals with Lake Michigan locally.

The following data is fed into the data computer:

1) Depth and temperature variants.

2) Current factors.

3) Wind and wave action.

4) Input from natural sources, such as rivers.

5) Flow from the lake.

6) Evaporation.

7) Artificial inputs from industrial, agricultural and sewage treatment sources.

8) Shipping and boating disposals.

9) Miscellaneous items from Federal, state and local data banks.

And you should know that, from time to time, there are thermal bars out in the lake at about 3 miles distance that make the inshore waters a river to be treated separately, and you cannot count on the rest of the lake to take care of your pollution problems from the inshore waters.

At this point, preliminary charts or mathematical models are printed out, checked and verified against standing verified data, to ensure the accuracy of the model.

Refinements follow so as to give a clear picture in the parameters desired: dissolved oxygen, coliforms, phenols, oils, chlorides, etc.

In the past, after determining the presence of pollution, the engineers took over and planned, designed and built waste treatment plants, at a cost of hundreds of millions of dollars and then tested the waters after the plants were in operation, several years later.

The use of data computer does this better and at less cost. In a short space of weeks or less after a basic model has been created, the data computer can give the results in advance of construction, in advance of the obligation or expenditure of millions of dollars. For a cost of thousands, dependent upon the variables used, the data computer can turn out model after model to determine comparative results in advance.

For instance, Dr. Singer ran off a simple model on Dissolved Oxygen: Here is the graph on a city like this (indicating) and on a factory like this (indicating) and if you put in secondary treatment it flattens it out (indicating) so that you know in advance from the data computer exactly what will happen from putting the plants in.

Before any expenditure of funds for planning, designing, engineering and construction we can know, we can foresee what a treatment plant will do, and if its proposed placement will not do the job properly, we can try it in a different location for a better result. If the type of treatment is not adequate, we will know before it is designed, and we can design and build the type of plant the computer shows is needed.

These mathematical models can be and will be a most useful tool in planning our environmental future to get the best possible environment, to get the most for our tax dollar. And the time for the use of the mathematical model for water quality is now.

We are about to spend an additional $12 billion of the taxpayers' money for needed additional sewage treatment and additional billions for industrial and "agribusiness"treatment without knowing positively what the results will be.

We must build all these treatment plants, we must clean up our waters, but we also must know in advance that the money poured into this construction will produce the necessary results. And only these types of mathematical models will give us the answer as to whether or not we will get the job done properly.

As said too often,"this is not my problem" --

is what most people say -- "It is the other fellow's problem."

"Am I my brother's keeper?" -- is the question, and too often we get the answer, "Not if he is downstream from me."

I note that this Conference has not taken up the schedule of implementation of all waste treatment plant construction. I think this is a mistake. One year ago we had everybody slated to complete all necessary work by December 31, 1972, with many dates for completion falling before that date. It is with dismay that I see no report to the public on these vital schedules. The public is entitled to know and this panel should from their records make public the present status of all these construction schedules.

I believe that certain questions should be answered:

1) Why is the North Shore Sanitary District in an affluent area about two years or more behind its schedule? What is being done about it?

2) Why is Milwaukee behind its chlorination schedule? And why does it now want to use a second-rate type of chlorination?

3) What is the status of the Indiana Harbor Canal discharges which go directly into the lake?

4) What is the status of the paper company waste treatment on the Fox River and Green Bay?

5) What is the status of the industries and the cities, such as Grand Rapids, that have been dragging their feet on the Michigan side? And here I talked to Mr. Purdy and he said it is not Grand Rapids -- they have a pilot plant project -- but Battle Creek that has been dragging their feet. Gentlemen, I am very much interested in that because I was instrumental in getting you the money to run these tests.

6) What is the status of the tests that the various States have been running on the accumulation of DDT in critical areas?

Gentlemen: The public deserves a public answer, a full answer, with no punches pulled as to the status of items on Lake Michigan and the steps you gentlemen are taking to preserve and save Lake Michigan for future generations.

Thank you.

MR. STEIN: Thank you, Mr. Klein.

I would point out that I certainly agree with you that the holding of a Conference without checking on the schedules may be a mistake, but the agenda shows for item 6, Status of Compliance with Conference recommendations and, as I understand it, Mr. Mayo, we do intend to get to this after we complete the thermal.

MR. KLEIN: I am pleased to hear it.

MR. MAYO: Yes, it is on the agenda following the thermal issues and the presentation of the pesticide committee report.

MR. KLEIN: Thank you very much. I know that. That is why I asked about the DDT and the clams.

MR. STEIN: Are there any other questions or comments?

MR. KLEIN: Thank you very much, Mr. Stein. I appreciate your courtesy.

MR. STEIN: You know, I appreciated, Mr. Klein, your statements about that computer. I know it is used to get a man on the moon, to set up timetables for airlines, and I guess in the midwest it is also used -- as I read in the paper -- to program what railroad cars go to certain sidings. (Laughter)

MR. KLEIN: Obviously, somebody used it wrongfully to get it to the wrong sidings, as I understand from the paper.

Mr. Stein, I might say that IITRI has invited about fifteen of the conservation groups, such as the Izaac Walton League, League of Women Voters, CAP, SAVE, and the

Illinois Federation, and the Izaac Walton League I have said already, on April 19, for a demonstration of how this works, and we hope and trust that they will give us their support. I think it is necessary to get the job done. It is a very, very effective tool for the south and western portions of Lake Michigan, which are the critical portions, as you know.

MR. STEIN: Thank you very much.

MR. CURRIE: Mr. Chairman.

MR. STEIN: Yes.

MR. CURRIE: I am glad that Mr. Klein has raised the question of compliance schedules because I too believe that is the most important business of this Conference. He has also raised specifically the question of the North Shore Sanitary District, which is a question with which our Board is deeply concerned. There is a case before us now, Mr. Klein, involving the Sanitary District, and we will decide it next week.

MR. KLEIN: I know. I stopped in at the hearings up there. I just happened to be in Lake County on a Probate matter, and I joined Mrs. Rome for lunch and she was telling me about it.

However, I will go one step farther. I don't think that your Board should be burdened with these kinds of cases. I think that any citizen should be allowed to go into any Court to abate pollution; not to get damages but to abate pollution.

MR. CURRIE: That is, Mr. Klein, so in Illinois.

MR. KLEIN: And I think the sooner it is done the sooner we will get our waters cleaned up, because government just cannot handle the ramifications.

There are 300,000 industrial plants in the United States, and between the Federal Government and the State Government they probably have only touched on about 1,000 of them.

MR. CURRIE: The suit that is pending before us, Mr. Klein, is, in fact, a citizen's suit.

MR. KLEIN: I know, but it's being put through administrative instead of being directly in the courts, and I as a lawyer would rather not have it in administration, I would rather have it in the courts because it is going to wind up there anyway, but it will be a year or two delay before it gets there.

MR. STEIN: Any other comments or questions?

MR. PURDY: One other comment, Mr. Stein.

I note with interest Mr. Klein's remarks about the spending of $12 billion of taxpayers' money for needed additional sewage treatment plants. And, in going on, he stated we must build all these treatment plants, we must clean up our waters, but we must know in advance that the money poured into this construction will produce the necessary results.

I feel that he is speaking that we ought to make certain that the money that we spend first goes into treatment plants that will, in fact, produce a measurable betterment in the receiving body of water. And I can't help but comment on this because I fear that the way that we are moving, and the proposed new legislation to set effluent standards on a uniform country-wide basis does not lead toward this type of activity; that it tends to dilute our resources and that we will be putting money into some situations that could be used in other more critical areas.

MR. KLEIN: If I may answer Mr. Purdy, I have never been in favor of effluent controls on a standard basis nationwide, but I think we should have the data on every bit of effluent that goes into every creek, every river, and every lake, such as North Carolina has had since 1957 and 1961. And on the basis of that we can project our mathematical models and come up with the answers of what should be done in each and every place in order to get the desired parameters that we need in each and every place.

MR. PURDY: Agreed.

MR. KLEIN: And I think that the sooner we get to these effluent controls the better, and that is the basis of the bills that Mr. Stein and I drew a year ago for the President and that have now been resubmitted to Congress. They are the bills that Mr. Muskie gave us at our hearing last year and the House of Representatives didn't even have a hearing, and if we are going to get them out we are going to have to get Congress to do some action on them. Thank you.

MR. STEIN: Thank you.

And I just say this, for clarification for the record -- Mr. Purdy may want to answer it -- as I understand the legislation, it does not call for effluent standards -- and this is the key point -- on a uniform National basis. It calls for the establishment of effluent standards.

MR. PURDY: It calls for the establishment of effluent standards in accordance with industrial categories to be adopted by the various States upon the recommendations of the Administrator of EPA.

MR. STEIN: Again, this is a question of fact, Mr. Purdy.

MR. PURDY: Well, it appeared at Senator Muskie's hearing on March 16 at which he testified.

MR. STEIN: All right. Are there any other comments or questions?

Mr. Blaser.

MR. BLASER: We have a number of people who asked to speak yesterday. We want to give everyone the chance to be heard. Many of these people have asked only for two minutes or even as little as a minute to speak. There are a total of fifteen yet to go. The next one is David Comey, Director of Environmental Research, Businessmen for the Public Interest.

Mr. Comey.

STATEMENT OF DAVID DINSMORE COMEY, DIRECTOR OF ENVIRONMENTAL RESEARCH, BUSINESSMEN FOR THE PUBLIC INTEREST, CHICAGO, ILLINOIS

I wish to commend Mr. Ruckelshaus for the responsible position he has taken in his letter delivered yesterday at this Enforcement Conference. I especially approve of the part B, discharge standards applicable to all new waste heat discharges exceeding 500 million B.t.u./hour, which have not begun as of March 1, 1971.

I have some doubts about the part A standards applicable to present waste heat discharges, but in view of the restrictions involved, I will not burden the conferees at this time with the details. I request permission from the Chairman to submit a written statement spelling out these doubts within two weeks.

I have distributed to each of the conferees a copy of the Palisades Agreement reached between the Intervenors and Consumers Power Company. Many of the conferees have already received copies last Tuesday, but since extra copies seem to be in demand, I am making more available.

You will note that we agreed to let Consumers operate the Palisades Plant during installation of the cooling towers. They have 32 months to install mechanical draft towers or 42 months to install natural draft towers from the signing of the agreement. In view of Mr. Currie's questions yesterday morning, I think these figures represent a realistic retrofitting time for all nuclear plants presently under construction around the lake. I would not encourage any time schedule shorter than this, because I believe Consumers' engineers have been completely honest and candid with us about the problems and time schedule involved.

We also commend Northern Indiana Public Service Company for its decision to build a cooling tower at Bailly. Although we have been their adversary and are opposing their plans to build two new fossil fired facilities on the lake at Michigan City and Gary, because we feel no new powerplants ought to be built on the shores of Lake Michigan, we do applaud their decision as a courageous one.

Businessmen for the Public Interest hopes that the Federal government will not waver in its determination to stick by the standards proposed today, despite the position taken by the States. If State agreement is not reached within a few weeks, we respectfully suggest that the thermal standard problem be declared unresolved, that it be lifted out of the Enforcement Conference procedure, and that these Federal standards be promulgated after appropriate hearings have been held.

Businessmen for the Public Interest believes that closed cycle cooling systems should be required at all nuclear plants presently under construction on Lake Michigan. If this Enforcement Conference fails to adopt the proposed Federal standards, B.P.I. is prepared to intervene in the AEC hearings for each plant to oppose issuance of the operating license unless closed cycle cooling systems are installed. We are currently drafting the intervention papers for Point Beach Unit 2, and we will do the same for all the other plants as they come up for licensing.

I would like to note that we will not be able to raise thermal pollution problems at these AEC hearings, because of the convoluted interpretation that the AEC has given to the National Environmental Policy Act in its Appendix D to 10 CFR50. The AEC argues that it has no jurisdiction over thermal pollution, and indeed the Commission's Regulatory Staff argued at the Palisades hearing that the Commission had no expertise in this field. (I also refer you to the Commission's statement at the bottom of page 70 in the Palisades Agreement.)

In view of this position, were this a judicial hearing today, I would make a formal motion to strike all of Mr. Conti's testimony yesterday morning on the ground that it is an affront to justice to parade before this Conference as an expert and then hide behind legalisms in one's own forums and proceedings. Since this is not a judicial hearing, I merely enter my strenuous objection for the record.

I have one further comment: Yesterday Mr. Currie asked if there was any evidence as to whether or not the retrofitting of cooling towers on Zion was worth $20 to $40 million.

I would like to ask Mr. Currie if he has any evidence to show that it would not be worth $20 to $40 million.

MR. CURRIE: That is my assessment of the record, yes, Mr. Comey.

MR. STEIN: Does that complete your statement?

MR. COMEY: Yes, it does.

MR. STEIN: Are there any comments or questions?

Mr. Dumelle.

MR. DUMELLE: Mr. Stein and Mr. Comey, I take with a great deal of interest Mr. Comey's proposal to lift the thermal standards from this Conference and to put it in the hands of the standard-setting action. And I think we have a precedent in process which I participated in, in April of 1969. This involved setting basically secondary treatment criteria for the States of Iowa, and to my knowledge it has not yet been resolved even though it has gone through the hearing stage -- of which Mr. Stein was the Chairman -- and the Governor has requested a 5-man hearing board, and I would like just the chairman to put on the record the present status of the Iowa situation and the prospects for its solution.

MR. STEIN: Well, Mr. Mayo has been closer than --

MR. MAYO: We expect that at the Iowa Water Pollution Control Commission meeting tomorrow morning that there will be a series of actions taken by the Commission that will respond in a very positive way to the proposed Department of Interior position as it was then put forth in the promulgation of standards. And that with the completion of that action by the Commission tomorrow we should have resolved any remaining differences with the State of Iowa, outside of the forum of the hearing process.

MR. DUMELLE: Does this involve secondary treatment for Burlington?

MR. MAYO: It specifically identifies secondary treatment requirements for the municipalities discharging into the Mississippi, and defers a decision on Burlington until about the first of July 1971.

MR. DUMELLE: Thank you.

MR. STEIN: Are there any further questions?

MR. PURDY: Yes, Mr. Stein.

Mr. Comey, yesterday in the statement made by Mr. Frangos for Governor Lucey, he mentioned having cooling facilities in operation by early 1973. The conferees discussed also yesterday this matter of when these facilities should be in operation in accordance with the Federal recommendations, something that we would have to explore.

Now, I know in the material that you have submitted to the conferees, you have noted a 32-month agreement with Consumers with respect to their Palisades plant if the forced draft wet cooling towers are used. You also indicated a 42-month period if the natural draft wet cooling towers are used.

This is a much longer period of time now than what Governor Lucey has recommended. Do you think that in view of your experience in negotiations with Consumers that the 1973 date is a reasonable date?

MR. COMEY: Well, possibly in late 1973, if Governor Lucey knows of a pump manufacturer who is willing to deliver pumps within the current deadlines of possibly 24 months, perhaps he can meet his own deadline. But the industry seems to be having problems with getting pumps out of their suppliers.

MR. PURDY: Well, I gather that the intervenors felt that Consumers Power had made a bona fide effort to get pumps from available suppliers, and that as such pumps are not available within this time span.

MR. COMEY: That is correct.

We believe that Consumers' engineers, as I said in my statement, were completely candid, and I did a little checking on my own, and I have found that the industry is at the present time in a state where there is such a backlog of orders for pumps that it is simply impossible to get a firm deadline of anything less than 24 months for the type of pumps that are required.

I might add that there is also a forced measure or clause in the agreement with Consumers so that if they are unable for bona fide reasons, the usual act-of-God type of causes, it could extend the 32 months to the 42 months beyond that, and I certainly think that that sort of consideration ought to be given to the other utilities around the lake.

MR. PURDY: Now, you mention that because of the backlog of orders -- now, what would you venture might happen if it is determined by the various States that we should go into backfitting, and then there is again a much greater demand for this same type of equipment? It would seem that possibly the backlog might even grow larger, and that the time period for delivery could stretch out.

MR. COMEY: I think that is possible, but I have enough faith in U.S. capitalism to believe that the companies will do everything they can to meet the market.

MR. PURDY: Thank you.

MR. STEIN: I don't want to prolong this, but I think several questions were raised, and one that perhaps in a sense goes to the heart of the matter on the way the conference works and the alternatives.

First of all, this conference has been called on the basis of a written request of the Governor of Illinois. Under law, once we get a request from a Governor for a conference of this type, the action on the part of the Federal agency, as I read the law and I think everyone else does, is mandatory, and we have to follow the procedure through. I am not sure with the legal obligations that we have with their Governor's request that there can be any lifting to another body.

The second thing that I would like to point out -- and I am not taking an issue with any of Mr. Comey's remarks and Mr. Dumelle's questions -- is this. If you go to another forum, I sense there may be a little dissatisfaction with the time that the other forum takes the procedures in the other forum.

What I am suggesting here is that in this forum all you people have a full opportunity to express your views. I think you should look at other forums. I haven't seen any universal satisfaction with another forum, not that they couldn't be used concurrently as they often are.

MR. COMEY: Mr. Stein, I would agree that the public is always dissatisfied when government does not move swiftly.

MR. STEIN: Well, I'll tell you, I spent a good portion of my life -- 4 years to be exact in the Army during the war. One of the objections that I had at that time, and the reason why I was supposed to go there and give my life for it, if necessary, was that we were fighting a government that I think moved a little too swiftly. (Applause)

Are there any other comments or questions? If not, thank you very much.

Mr. Blaser.

MR. BLASER: The next speaker on the list is Ruth Collins, International Representative of the United Auto Workers. Miss Collins.

MRS. BOTTS: Mr. Stein, she was called yesterday by Michigan and her statement has already been submitted.

MR. STEIN: Right. Thank you very much.

MR. BLASER: Next is Catherine Quigg representing the Pollution and Environmental Problems. Catherine Quigg? If not here, she left her statement with me which I will have entered in the record if acceptable.

MR. STEIN: Without objection that statement will be received as if read.

STATEMENT OF CATHERINE T. QUIGG,
POLLUTION AND ENVIRONMENTAL PROBLEMS,
PALATINE, ILLINOIS

Mrs. C. T. Quigg

I represent PEP (Pollution and Environmental Problems) with over 300 members in twenty-four suburbs of Chicago. We urge the Federal Government to require closed cycle cooling systems now on all proposed and existing nuclear powerplants -- not in 1975 or later when the damage is done.

Today the power industry is using 8 percent of Nation's total supply of freshwater flow for cooling. If closed circuit cooling towers are not used -- 100 percent of the freshwater would be needed for the electric power industry alone by the year 2005.

Closed cycle cooling towers use the same water over and over again. The only water needed is enough to replace the water that evaporates during the cooling process.

That's why a powerplant with a cooling tower needs only 5 percent as much water as it would with a no-tower system. No water -- hot or cold -- is returned to the waterway when cooling towers are used.

Utility representatives tell us these towers aren't aesthetically desirable on our scenic lakes and rivers. I suggest that with closed cycle cooling towers, large rivers and lakes aren't needed at all. Plants could be hidden in the hinterlands.

Still other power industry officials say cooling towers create dangerous banks of fog in the surrounding

Mrs. C. T. Quigg

areas. However, most evidence is contrary to this claim. Cincinnati Gas and Electric's project engineer William Murray said, "For some reason natural towers do not create significant fog, even though the law of physics indicate they should. I wish I could say otherwise."

In opposing cooling towers some utility officials point to their cost and say that the utility doesn't want to pass "unnecessary expenses."

The Zimmer tower for Cincinnati Gas & Electric will account for about $11 million of the $300 million project cost.

How much will Cincinnati electric bill payers be paying for the cooling towers? According to the Edison Electric Institute in New York City and CG&E it works this way: Construction cost is about 24 percent of the over-all bill, and towers add about 5 percent to the construction cost. So towers add about 1 percent to the bill.

The average residential bill for CG&E customers in 1970 was $14.73 a month. Therefore, the cost of electricity would go up about 13 cents a month, or $1.56 a year.

Let's done with the self-serving arguments of industry. The public is depending on the State and Federal governments to set strict "no heat, no radioactivity" discharge standards for Lake Michigan. We ask that you set these standards now -- before it is too late for the lake.

MR. BLASER: The next speaker is Mrs. Pearl of Highland Park. Mrs. Pearl.

Mrs. Botts, you might just sit up forward and keep us informed of who is here and who is not.

MRS. BOTTS: The four ladies from Highland Park asked me to say that they had submitted a petition with 5,000 signatures and a written statement on behalf of a women's study group of Highland Park which has 150 members which has concluded that waste heat from the nuclear plant should be kept out of the lake. Their statement had been submitted in writing. They were here yesterday all day.

MR. BLASER: All right, that will cover Mrs. Pearl, Mrs. Heyman and Mrs. Kalish?

MRS. BOTTS: Yes.

STATEMENT OF MRS. JAY HEYMAN,
HIGHLAND PARK, ILLINOIS

MRS. HEYMAN: One of Commonwealth Edison's scientific consultants has said many times, "I am convinced that one of the highest and best uses of some water from Lake Michigan would be as cooling water for large nuclear powerplants."

Mrs. J. Heyman

I am speaking for 150 women from Highland Park who have intensively studied the increasing problem of electric powerplant pollution. We have discussed, debated and agonized over our decision.

We have decided that Lake Michigan is our lake, not Commonwealth Edison's, not the electric utilities. We think the highest and best use of Lake Michigan is to preserve it as a resource for ourselves, our children and future generations. We are unwilling to gamble with the future of the lake. In the light of conflicting scientific evaluations of probable damage to the lake, we demand that our Government, representing us, adopt a no heat standard for the lake. A cautious policy of maximum protection, rather than treating damage after it occurs, is the only sensible answer.

Over 2000 people agreed with us. We got 2200 signatures on petitions, which we turned over to SAVE, asking that no heat be allowed into the lake. We have written your offices, we have flooded our Congressmen, we have written to the newspapers, we have spoken before local groups, with the same message: No discharges from electric powerplants, be they heat or radiation, are acceptable.

We have many concerns about future electric powerplants. 1) We believe there should be a ban on future nuclear plants on Lake Michigan. We believe long term ecological effects will be difficult to assess in 5 years. The lake is already dirty; it recirculates once every 100 years; keep new pollutants (heat and radiation) out of the lake. 2) We're not buying the necessity of either fossil fuel or nuclear plants at this moment. There is a crying need for the Government to take a real, overall look at planning, siting, funding for research, developing alternate sources of energy. If we had put the more than $2 billion our Government has put into nuclear power into researching alternate sources, who knows what alternatives might now be available. We are willing to do whatever is necessary, in terms of active support, to get immediate priority and attention to the entire energy problem. We would like an honest, realistic answer about the problem of the storage of radioactive wastes, for instance. We will fight a blind commitment to fantastically increasing electric power demands, unless planning and research is done first.

We strongly suggest that public members be included on the committee that will monitor the lake. If, as reported in some newspapers, the Four-State Enforcement Conferences will be disbanded, and decisions made by the Federal EPA, we ask that there be regular, mandatory public hearings required, to guarantee the public's right to participate. Our fact sheet is attached. (See pp. 298, 299.)

Thank you.

STATEMENT OF MRS. J. BARTON KALISH
HIGHLAND PARK, ILLINOIS

We live along a part of Lake Michigan where the water, and particularly the inshore waters are already tainted by sewage, sent out after primary or secondary treatment into the lake -- and after heavy rains often without any treatment at all.

Besides the bacteria and solid waste, industrial and chemical wastes are also discharged into the inshore waters of Lake Michigan, near the present site of the Zion nuclear plant and other places along the lake front.

"All the effects of waste heat are not documented but we do know that heat decreases the oxygen dissolving capacity of water; and heat mixed with water containing nutrients produces increased algae growth and eutrophication. Furthermore, rapid changes in heat affect plankton, the life at the beginning of the food chain."

To allow powerplants to operate along Lake Michigan without cooling facilities for dealing with waste heat and an advanced radioactive waste control system, is taking

Mrs. J. Heyman

SAVE LAKE MICHIGAN FROM THERMAL POLLUTION

How Much of Your Time is Lake Michigan Worth?

By 1975, nine nuclear electric power plants will be operating around the shores of Lake Michigan, with many more planned for the future. Nuclear plants generate enormous quantities of heated water that must be put somewhere. The electric companies are planning to put it into Lake Michigan.

THE CRISIS: By ~~February 1[illegible]~~ March 23, 1971, the 4-State Enforcement Conference will set a thermal (hot water) discharge standard for Lake Michigan. The technical committee of the Conference has just recommended what what amounts to a green light for unlimited thermal discharges from electric power plants. The report says that utilities should either install cooling systems or prove that their discharges are harmless, but it fails to set a date by which such systems must be installed.

2 VIEWS: Mrs. Samuel Rome, Environmental Quality Chairman of the Illinois League of Women Voters: "It could be 1995 before cooling systems are installed. They threw caution to the winds. There is no restriction on construction (of power plants). As many plants as can be built will be built."

Robert Hartley, Committee Chairman: "We have to have power."

WHAT YOU CAN DO: RIGHT NOW is the time to take action. Write the following men, asking that no heated discharges be allowed into Lake Michigan. Send telegrams. Ask your Congressmen for an appointment to discuss this vital issue. Spread the word to as many others as possible! Get at least 5 other people to write. Write letters to the newspapers. Circulate petitions, demanding no discharges. Attend the Conference when it meets.

William D. Ruckleshaus, Director
Environment Protection Agency
Washington, D.C. 20460

Senator Charles Percy
Senate Office Building
Washington, D.C. 20510

Senator Adlai Stevenson
Senate Office Building
Washington, D.C. 20510

Representative Robert McClory
House Office Building
Washington, D.C. 20515

David Currie, Chairman
Pollution Control Board
189 W. Madison
Chicago, Ill. 60602

Clarence Klassen, Director
Environment Protection Agency
535 W. Jefferson
Springfield, Ill. 62706

Make these points in your letters:

1) No heated discharges should be allowed. Cooling devices are used by many electric power plants in this country; are technically feasible, and are relatively inexpensive (particularly so when compared to the possible dollar loss from recreational uses of Lake Michigan due to thermal pollution.) The effects of heated water are well known: oxygen depletion of water with harmful effects on aquatic life, increase in blue-green

algae, and rapid aging of the Lake. Lake Michigan flushes out only once every 100 years. Pollution to the Lake will cause irreversible damage. The technical report says it is necessary to deal with damage after it occurs rather than try to prevent it. Conservationists say the opposite: WE MUST NOT USE LAKE MICHIGAN AS A TEST TUBE.

2) A technical committee will monitor to see if there is any damage from the nuclear plants. Only government and industry spokesmen are to serve. There must be representatives of the PUBLIC on this committee. Also the federal government has neither the money or the staff to monitor and has not monitored the Lake since 1963. There must be adequate funding, and sufficient staff.

3) There must be long-range planning for total environmental impact of electric power plants on the Great Lakes. An unlimited discharge standard has dire implications for the many other electric power plants that will locate on Lake Michigan. Funding for research should be substantially increased. Priority must be given to developing other sources of power besides fossil fuel and nuclear. We have committed ourselves too early to nuclear electric power.

4) There must be mandatory public hearings when standards are set, when a land site is purchased, and pre-construction and pre-operation. An operating license should be renewed every 2 years, at public hearings.

5) Power companies should bear the costs of their own monitoring and should publish their results.

REMEMBER. THIS IS YOUR CHANCE TO SAVE LAKE MICHIGAN FROM THERMAL POLLUTION! Write! Spread the word. Contact at least 5 others to write. Write letters to the editors yourself! How much of your time is Lake Michigan worth??????????????????

Mrs. J. Kalish

unnecessary risks, especially with the inshore waters which are most visible and extremely sensitive biologically as well as very valuable recreationally.

Zion 1 and Zion 2, now planned with no cooling facilities would discharge 2,000,000,000 gallons of heated water directly into the lake.

Zion is located almost adjacent to the only State park in the area. A park whose beachfront has already felt the effects of the construction. Zion is also located only about 4 miles from another powerplant also discharging a thermal plume into the lake.

There are a great many of us who firmly believe that as long as there are alternative means of dealing with waste heat, alternatives to once-through cooling which are successfully used by powerplants now in operation, we must use those mean~ and set standards to protect Lake Michigan.

It makes no difference whether heat discharge from powerplants is the sole, provable cause of over-nutrification or changes in lake plant life and fish life. If heat is one factor which in combination with other pollutants, hastens damage to the lake (and this has been shown) then heat discharges in the quantities projected by the Zion plant and other powerplants are unacceptable without cooling facilities.

It is up to this Conference to protect the public interest in Lake Michigan as a natural resource too valuable to risk.

Thank you.

MR. BLASER: We are moving on pretty rapidly. Next is Mr. Bierma representing the Illinois Audubon Society and Chairman of their Clean Streams Committee.

Mr. Bierma.

STATEMENT OF HARRY V. BIERMA, DIRECTOR AND CHAIRMAN, CLEAN STREAMS COMMITTEE, ILLINOIS AUDUBON SOCIETY, BERWYN, ILLINOIS

I am Harry V. Bierma, a director and Chairman of the Clean Streams Committee of the Illinois Audubon Society.

There are many facets to thermal pollution. The following, I believe, have not been emphasized.

The costs of waste disposition cannot be avoided. With a privately-owned enterprise operated for gain, such as a utility, these must be a direct cost of production; not a hidden cost to be foisted upon society in general in the form of present and future environmental degradation. The thermal discharge of a powerplant is a waste by-product. Relative to it, these facts are known:

1) Discharge to a body of water will have a deleterious effect upon that body.

2) Natural ecosystems, such as a lake, are highly complex with many aspects not clearly understood; the long range subtle effects which may not be reversible, are not known nor can they be predicted from our present state of knowledge.

3) Present technology permits sophisticated treatment at reasonable costs that would minimize environmental degradation.

4) The construction of marginal facilities with later upgrading is costly; it is less costly to construct for minimal pollution initially even without considering the costs to correct environmental degradation where this may be possible.

For these reasons it would appear that closed cycle cooling systems should be required for all thermal electric power generating facilities using or planning to use Lake Michigan as a heat sink with variations only where it can be demonstrated that ecological damage will not result.

MR. STEIN: Thank you very much. Any comments or questions?

MR. BLASER: The next was to be Mr. Paul Goodman, Committee on Lake Michigan Pollution. His presentation will be made by Mr. Riefstahl.

MR. RIEFSTAHL: I have a petition. I will leave it with the secretary.

MR. STEIN: If it is agreeable with you, we will accept that petition as an exhibit.

MR. RIEFSTAHL: Thank you.

(The petition above referred to will be on file in Hq EPA and Region V, EPA Office, Chicago, Illinois.)

STATEMENT OF PAUL S. GOODMAN, COMMITTEE ON LAKE MICHIGAN POLLUTION, WILMETTE, ILLINOIS

(READ BY CHARLES F. RIEFSTAHL)

MR. RIEFSTAHL: My name is Charles Riefstahl and I am representing Paul Goodman to read his presentation.

My name is Paul S. Goodman. I am representing the Committee on Lake Michigan Pollution, Wilmette, Illinois. The Committee is a citizens organization representing members in the 10 North Shore suburbs in Illinois. The principal goal of the organization is to preserve and enhance the great natural resources of Lake Michigan.

Our organization with the assistance of the Lake Michigan Federation and the Illinois Wildlife Federation and some 50 other organizations present to you, the conferees of this Conference, the following petition:

PETITION

"We the undersigned deplore the introduction of nuclear powerplants to the lakes. We consider these plants a critical threat to our lake in the form of thermal pollution. Adoption of minimal thermal standards and closed cooling systems are potential answers. In addition we urge the adoption of effective monitoring procedures which should be made at the expense of the polluters. Data should be collected daily and should be public. As a further check, an agency independent from the power company should have access to the instruments and reports. Qualified scientists and biologists should evaluate the data quarterly and forward these reports and evaluation to the Four-State Lake Michigan Enforcement Conference for quarterly review."

This petition represents the sentiments of more than 10,545 citizens in the States of Illinois, Wisconsin, Indiana and Michigan. More important it represents the position of more than fifty organizations which represent a much larger citizenry concerned with Lake Michigan. We asked each organization to sample only a representative portion of their membership. Therefore, the petition represents a large constituency.

The basic theme of the petition is for action.

There are many unknowns about the effects of powerplants on our lake and it is advisable to err on the conservative side by setting low thermal standards and to assess the effect of existing plants and those under construction prior to introducing new plants. Most critical, however, is the effective monitoring procedures as a way to determine the impact of nuclear plants on Lake Michigan. We see the monitoring procedure as a way to provide data on the suitability of thermal standards.

Requirements for effective monitoring include: 1) continuous data collection; 2) by an agency independent of the power company and not under direct contract to that company; 3) review of that data by qualified individuals not in the employment of the company; and 4) access of data and evaluation to interested members of the public. We believe monitoring provides a way to reducing the uncertainty about the effects of powerplants by providing empirical data on ecological effects.

Respectfully submitted. Paul S. Goodman.

MR. STEIN: Thank you, Mr. Goodman.

Any comments or questions? If not --

MR. RIEFSTAHL: Mr. Stein, if I might request permission to insert a page in the pesticide portion as part of the Committee on Lake Michigan Pollution --

MR. STEIN: Are you going to leave now?

MR. RIEFSTAHL: Yes. I will leave this with the secretary.

MR. STEIN: Okay. And when that comes up -- are you going to be here for the rest of the morning?

MR. RIEFSTAHL: For the rest of the day, yes.

MR. STEIN: Why don't you wait and come up with that?

MR. RIEFSTAHL: Okay.

MR. PURDY: I have a question there.

MR. RIEFSTAHL: Right.

MR. PURDY: Mr. Riefstahl, in your petition, you asked that an agency independent from the power companies should have access to the instruments and reports. Do you also believe this should be, say, an agency independent from the State water pollution control agency, or do you feel that the State water pollution control agency can fill that role?

MR. RIEFSTAHL: They feel it should be in addition to the State. These nuclear plants have a 4-stage backup system. Perhaps it would be well to have at least a 2-stage backup system on the monitoring.

MR. STEIN: I didn't quite understand your answer. Go ahead.

MR. PURDY: You asked for an agency independent from the power company should have access to instruments and reports on the monitoring of their effluent to the lake.

Now, do you feel that the various State water pollution control agencies can fill that role, be the agency that is independent from the power company? Are you saying that some separate citizens group or some university group or something separate from the State water pollution control agency should have access to the reports?

MR. RIEFSTAHL: The thought was to have someone with no political and no monetary gain in that respect.

MR. STEIN: Are you through?

MR. PURDY: That raises another question.

Are you saying that the State agencies have monetary gain and political gain?

MR. RIEFSTAHL: Well, I think there is a separation there in the State —

MR. PURDY: Because if you are I object to it.

MR. RIEFSTAHL: — agency.

MR. STEIN: Let me raise this question because what you have stated here is something that I have been advocating for awhile, and I think I got the idea from a power company.

You know, if they can put a little meter in my house and check it when I can't change it, I figure we might turn the tables and put a meter in their place and come in and check it, too, and that could work with all industry not just the power company.

But to get to your next point, I believe, at least in the proposal that I have made, that the State and Federal Government should do it.

Now, the point is, if you are going to have an independent agency, somebody is going to have to pay them. You are saying "free of monetary or political considerations" -- in our society, where do you find that? Someone is going to have to put up the scratch, and if this is a public agency, it is going to have to come from the State or the Federal Government in this field, isn't it?

MR. RIEFSTAHL: That is the way it looks.

MR. STEIN: All right.

MR. RIEFSTAHL: But perhaps the State could be one group and the Federal another.

MR. STEIN: Some of the people here have been saying we are not too independent of each other.

I have read the stuff about the Conference where people have discovered after almost 200 years of our history that the State and the Federal Government in effect are an interlocking director.

MR. RIEFSTAHL: I think we have an awakening of environmentalists and of the general people, as would be evidenced with the petition. This petition actually was not forced and not sold and still comes up in a very short time with over 10,000 signatures, and I hope that the people who signed it are now more dedicated and a little more educated about the necessity for some controls.

MR. STEIN: Mr. Riefstahl, may I make just this as a suggestion to you since listening to your stuff.

I think you are onto something here with this independent monitoring. What I am saying, I think that this independent automatic monitoring is so important that I hope your group will think this thing through, and to make it a really viable operating proposal, where we can get an agency and pay for that agency, wherever it may be constituted to do it.

Now, if there is another way of getting the money than through public sources -- and I don't think we can really depend on foundations for this -- I hope you would come up with that so you would have a proposal that we could take and go with.

MR. RIEFSTAHL: Well, we are planning on pursuing this. I do know that there is a private engineering firm that has been doing some work around the Big Rock Point plant, and we haven't been in touch with them yet, but we certainly hope to get in touch with them.

MR. STEIN: Thank you very much.

MR. RIEFSTAHL: Thank you.

MR. PURDY: I have one other comment and this doesn't call for any response.

Mr. Fetterolf, our biologist, poked me in the ribs on this qualified scientist and biologist, where apparently a biologist is not a qualified scientist. (Laughter)

MR. BLASER: My next request is from Eileen Johnston, who is Environmental Chairman for the League of Women Voters.

MRS. JOHNSTON: No, no. I am but I am not now.

MR. BLASER: Oh, you were, but you are not now.

MRS. JOHNSTON: I am here just as a citizen.

MR. BLASER: She is speaking as a citizen.

MRS. JOHNSTON: I will lose my job. I am here just as Eileen Johnston, a citizen.

MR. STEIN: Well, I should point out that Mrs. Johnston has been -- if she is just a citizen, she has been a most loyal citizen. If anyone is talking about monitoring, Mrs. Johnston has monitored us from the very beginning.

MRS. JOHNSTON: You are not kidding, and I loved it all.

MR. STEIN: You talk about impartial monitors without getting paid, that is the living example of that. But, Mrs. Johnston, you are the only saint I know. I don't think there are many more like you. We love you.

MRS. JOHNSTON: Oh, Murray Stein. I love him.

STATEMENT OF MRS. EILEEN L. JOHNSTON,
WILMETTE, ILLINOIS

MRS. JOHNSTON: Before I start, I would like to submit a statement by a high school student group that is very active since their Earth Day last year, and they, in essence, support the position of the Committee on Lake Michigan Pollution that Charlie Riefstahl just read and, Carlos, I apologize for that statement. We consider biologists as scientists.

And I don't know -- do you want this read, Mr. Stein? Would you want to read it? No other student has spoken.

MR. STEIN: How long --

MRS. JOHNSTON: It's just a page.

MR. STEIN: Do you want to read it?

MRS. JOHNSTON: Well, I am going to say a lot of other things.

MR. STEIN: All right. Why don't you just put that into the record.

MRS. JOHNSTON: I will give this to Mrs. Hall, then.

Well, I will wait until later. I have another statement that I would like to submit for another student.

Mr. Stein and conferees, thank you for the opportunity of meeting with you again at this very important Conference. My name is Eileen L. Johnston and I live in Wilmette, Illinois.

Mr. Stein, I was told in a letter I received from Mr. Teeter in a reply to one I had written to Mr. Ruckelshaus that the Calumet Enforcement Conference had been combined with the Four-State Conference. Is this true? Are we at a Calumet Enforcement Conference?

MR. STEIN: No, this is the Lake Michigan Enforcement Conference, but if you want to bring anything up about the Calumet, feel free to do so.

MRS. JOHNSTON: Well, I wish Mr. Teeter hadn't told me that because I was anticipating that also.

Anyway, I am here to tell you that in my humble opinion the Four-State Enforcement Conference must continue. Citizens need a time to review the progress being made by industry and municipalities, to meet them face to face. We need to be informed of new breakthroughs in research in pollution control equipment, biological studies, virus control, studies of the causes of eutrophication and how to combat them. We want to know how technology is being used in the cleanup of Lake Michigan. I do feel that the Lake Michigan Conference has accomplished a great deal. And believe me I get to all of them. I don't know what condition Lake Michigan would be in if we hadn't had them. It is obvious that standards could have been set more stringent and that a shorter timetable for compliance would have been wise.

I have great confidence in the conferees and Mr. Stein and also appreciate the work that the Technical Committee has done. I think that if citizens had the opportunity of serving on some of these committees, maybe they might appreciate the problems that they have -- personnel is one, and financing -- and if citizens really want to do something, get rolling on getting some money for the EPA to deal with the personnel problem. That is one of the big ones.

Sometime ago, the Illinois Pollution Control Board sent a letter of proposed recommendations for modifying the Conference. I believe there were included a number of very good suggestions that would lead to a better Conference and speed up the lake cleanup by accelerating dates of compliance and give us specific pollutants with sources and polluters to concentrate on.

And I will not go into that because I believe that will be taken up later.

Now, I also want to state that I back up the Illinois Pollution Control Board in their tentative -- underlined -- position in regard to thermal discharges to the lake and any final draft they come up with, although I do not always completely agree with their decisions. I have the highest regard for this capable Board and appreciate what they are doing to clean up the deplorable mess that we are in.

And, again, I think if more citizens came to their meetings and hearings, they would understand better why some of the decisions they make are made.

At the first Four-State Conference, I stated that Lake Michigan was not the Four-State Dump, but it is still being used as such by industries, municipalities, farmers, boaters, and by people in general. Isn't it time that we really take final and drastic steps to put a stop to this gross contamination of our water supply?

Down in the strip mine area of southern Illinois there is an interesting sign that reads: No Fishing, No Swimming, No Hunting, No Anything. The last mentioned expresses my feelings about the lake. And I would like a nice big sign out in the middle of the lake: No Phosphates, No Nitrates, No Chlorides — the rest of them — No Pesticides, No Heat by Thermal Input, No Radioactivity, and no anything that is uncontrollable.

And in answer to Carl Klein — I don't know whether he is still here — the reason the North Shore Sanitary District is still dumping into the lake is because of citizens. It is a very sad tale and I think that the meeting on the 31st of March is going to be very helpful in regard to this. But they have held up this construction for 2 years, I believe, and at considerable cost.

So the above-mentioned means better agricultural practices to control runoff of phosphates, nitrates, and pesticides — I am afraid I am losing a friend here in the audience. The Agriculture Department has been sleeping for the last 100 years. Let's give them a jab. Urban people can use less fertilizer and pesticides and use better methods of containing runoff. We can eliminate the use of phosphates in detergents. And I will submit a paper later on that for a student group.

Of course, this means a huge amount of closed cycling for industry and power companies. We have the technology, so let's use it. In my opinion this is the only way we can clean up the southern end of Lake Michigan and the Calumet River which flows intermittently into the lake. Industry has no more right than power to dump heated effluent. A certain very well known steel company -- the one that gets the most publicity and starts with U.S. (Laughter) -- has no more right than power to dump heated effluent. But they dump 11° of water -- it's heated 11° before returning it to the lake. And, Mr. Stein, do you remember the trip we had down there in 1968. This was a brand new plant.

I have a question for John Q. Public out there. Are you willing to live a less affluent life? Are you willing to live without air conditioners? They seemed to be the main cause of possible power shortage in our area this summer. Now, I attended a meeting, a hearing before the Pollution Control Board Monday of this week, and I came away fighting mad and I still am.

Now, I wasn't as mad at Commonwealth Edison, of course, but the citizens who were buying the darned air conditioners, and the newspapers -- and I told Casey Butler this morning the first time I see an ad on air conditioners, I cancel my subscription, and I write a letter to the editor, and I think all of you and all concerned citizens should do the same.

Here we are complaining about thermal pollution from powerplants, at the same time we insist on having more power with all of the electrical gadgets, power mowers, and so forth, that we use. So, citizens have not accepted responsibility they should. All of the bad guys are not with the power companies and industry; there are just as many in the citizens, and I am probably at fault in many ways also. But I try.

Well, Mr. Stein, I sort of don't stick to the subject, as you well know all of these years. But synergism is to me the most important word in our vocabulary. Due to the synergistic effects of all the pollutants in our water and air, I find it impossible to speak of thermal pollution alone. It is just one big package deal.

I have great concern for the radioactive wastes that go into the lake along with the heated effluent. I hope that all four States eventually will agree to a closed cooling system for nuclear powerplants for that reason. We need to proceed cautiously, thoughtfully, yes, the high cost way, but since we know radioactivity builds up in man aren't we willing to pay the price?

I have great concern for the high level wastes that are isolated, concentrated, and shipped to storage areas. The low level waste that is released into the air or water at the reactor site is more alarming. Since many radionuclides have long half-life it is no satisfaction to know that they will be diluted for their radioactivity does not cease but builds up in the ecosystem.

Another unpleasant thought is the possibility of nuclear fog caused by an inversion, and taking more radioactivity going into the lake. There is always the possibility of accidents and many have occurred. We know that: 1) any dose of radiation, large or small will take its toll of cell material and this is irreversible; 2) it may take years for organic damage or even generations for genetic damage to manifest itself; 3) all vegetation and animal life are also vulnerable to radioactivity intake and they pass up the food chain from grass to cattle to milk to man.

I would like to give you a few quotes from some scientists that I have high regard for.

One is Ralph A. MacMullen, Director of the Michigan Department of -- well, it was the Department of Conservation -- at the first Lake Michigan Conference in 1968. It was the Calumet Enforcement Conference that met in 1965. "What will be the effect if we permit the equivalent of 10 huge hot-water rivers to flow into Lake

Michigan? We frankly don't know. I suggest that we ought to be finding out, and we ought to be aware of the probable consequences before we go any farther with this kind of development. Otherwise, we may find out the hard way — after it is too late."

The other night — well, it was a week ago — I had a long telephone conversation with Dr. Charles W. Huver — H-u-v-e-r — a Professor of Biology at the University of Minnesota. He is also President of the Minnesota Environmental Control Citizens Association. The following are some of his observations: The question of the effect of increased temperature on the availability of oxygen to aquatic organisms needs careful consideration. Heated effluents produce a major rise in the oxygen requirements of aquatic organisms while decreasing the amount of dissolved oxygen available to them. A second undesirable effect of increased water temperature is the increased toxicity of any toxic chemicals that might be present in the water.

The potability of drinking water can be seriously affected by blue-green algae — and I think all of us can agree to that — so that they can markedly affect the quality of municipal water supplies.

Two University of Minnesota Professors, Dr.

Samuel Eddy and Dr. T. C. Olson, have studied deaths of fish and animals from decay of blue-green algae and say they are caused by the release of a highly toxic substance in it.

In regard to radioactive wastes he says: "The major problem we should address ourselves to is the biological effects of low-level radioactive wastes."

There is no safe threshold for genetic effects of radiation. We have seen that there are three types of nonthreshold effects to be expected when there is any rise in environmental radioactivity, an increased mutation rate, and increased cancer rate, especially of leukemia, and an increased aging effect and shorter life span of the individual receiving the radiation.

It is clear that thermal and radioactive pollution can act in a synergistic manner to increase the radioactivity of organisms subjected to both of these influences.

Dr. Huver strongly supports the view that because of serious ecologic consequences and danger to human health, citizens should ask for a closed cooling tower system so that thermal effluents can be recycled.

Dr. Huver also expresses great concern for tritium which is the predominant isotope released to the environment in the liquid waste discharges of light water reactors, and it is especially serious because there is no practical method for filtering or removing tritium from the effluent. It can produce chromosome breakage, genetic mutation, growth inhibition, cancer, cellular death when taken in sufficient amounts of water. He feels tritium effluents should be taken to off-site disposal areas.

Since we have what amounts to a river along the shore of the lake due to the thermal bar, radioactivity is very significant because it moves close to water intakes.

Dr. John Cairns, Professor of Biology at Virginia Polytechnic Institute says that we must protect the ecosystems we have, since they have taken thousands of years to develop and we know they work given appropriate conditions. It seems the real choice for the future is between thermal pollution and a shortage of electric power. He says more realistically the choice lies in deciding how much money and effort we are willing to invest in cutting down heat pollution now in order to avoid future catastrophe and permit the continued expansion of electric power. Every new powerplant has a cost that must be paid either in environmental damage or in economic investment to prevent heat pollution of water, and we have a choice of whether we want to pay it all one way, all the other, or partly in both.

Mr. James Vaughn, Engineer for Water Purification, city of Chicago, who is back there with us and I know he is going to give a statement said: "We have shown increasing trends in both chloride and sulphate concentrations in water at the southern end of Lake Michigan. We can only view with alarm the use of wet cooling systems. These would have to be disposed of in large measure by blowdown. There can be no question that sulphate and chloride ion pollution from cooling water blowdown would be both harmful and irreversible."

Dr. J. A. Mihursky, Chairman of the Department of Environmental Research at the University of Maryland and considered a thermal pollution expert, says: "Chloride, used to clean condenser tubes of steam electric stations, acts as a biocide and its use should be prevented. Other less harmful cleaning methods should be required."

I want to say lots of other things, but that is all at this time.

Any questions, I would be glad to try to answer them.

(The New Trier High School Environment Committee statement referred to by Mrs. Johnston follows.)

NEW TRIER ENVIRONMENT COMMITTEE

March 23, 1971

To: The conferees at the Four-State Lake Michigan
Enforcement Conference

Electric power consumption is increasing at a tremendous rate along the shores of Lake Michigan. Nuclear power plants seem to be the answer to this area's power requirements, since they do not need as much fuel as coal-burning power plants, and present no problem of air pollution. However, the heated water produced in cooling nuclear power plants presents a threat to Lake Michigan, this area's greatest natural resource.

As deeply concerned citizens who make a continuing effort to keep informed on environmental matters, we urge the conferees to support whatever measures are necessary to protect Lake Michigan from thermal pollution. We further urge the conferees, irregardless of private pressures, to be guided by one consideration only in their decisions: the ecological good.

Specifically, we suggest: 1) adoption of minimal thermal standards and support of closed cooling systems, such as cooling towers, which are known to be technically feasible 2) adoption of effective monitoring procedures, paid for by the power companies with data collected daily and made public 3) that an independent agency of scientists should have access to the instruments and reports, and be responsible for regular evaluation and quarterly reports to the Four-State Lake Michigan Enforcement Conference.

The recent action taken at South Haven, Michigan should set a precedent for nuclear power plant construction. Despite the fact that the ultimate result may be an electrical bill increase, we feel that action such as that taken in Michigan is worth the increase.

Respectfully submitted,

New Trier Environment Committee
New Trier High School West
7 Happ Road
Northfield, Illinois 60093

Alan Cohen-- Co-Chairman
Todd Cody-- Co-Chairman
Russell Mason-- Publicity Secretary
Ross Slotten-- Correspondance Secretary
Bill Lucchesi-- Secretary-Treasurer
Pat Eng-- Programs Chairman
Jeff Zonenblik-- Research Chairman

Martin Miller-- Faculty
Sponsor

MR. STEIN: Are there any comments or questions? If not, thank you for a very complete and delightful statement.

MR. BLASER: The next speaker, Miss Edith McKee, Chief Geologist, Theodore S. Leviton and Associates.

STATEMENT OF EDITH M. McKEE, C.P.G.,
CHIEF GEOLOGIST, THEODORE S. LEVITON
ASSOCIATES, CHICAGO, ILLINOIS

MISS McKEE: I am Edith M. McKee, a certified professional geologist and chief geologist for the consulting firm of Leviton and Associates located in Chicago. A resume of my professional credentials is attached to the copies of my testimony available to the Board members and the press. When I testified before you last October 2, I detailed my 36 years of continuing familiarity, both personal and professional, with Lake Michigan and in particular with Little Traverse Bay at the north end of the lake where the Big Rock Nuclear Plant is located.

Today I wish to report to you the results of field work done last year in the Little Traverse Bay area during June to October; this work was interrupted to testify before you in October, and field surveys were not completed until October 28th. This work has been carried on as an in-house study, without any financing or pressuring from industry, government, academia, or the public. However, there has been indication of public interest in future funding of such research work if industry and government fail to support it.

Factual observations concerning Little Traverse Bay are particularly relevant to this meeting because this is the only area of Lake Michigan where the cumulative effects on water quality from over seven years of thermal input from a nuclear powerplant can be documented. The Big Rock Nuclear Plant discharges each day enough heated water to cover the entire Little Traverse Bay to a depth of 1.1 inches if evenly distributed. When the discharge of the 4 nuclear plants to be operating around the southern basin of Lake Michigan is computed, this data indicates that each day enough heated water would be discharged to cover the entire southern basin of Lake Michigan to a depth of 1.1 inches if evenly distributed. This does not include heat input from fossil fuel plants or other industrial operations. Thus, Little Traverse Bay provides a valid pilot study of the long continued effects of heat input into a circulating lake system.

When the Big Rock Nuclear Plant was located north

Miss E. McKee

of Charlevoix at the southwestern entrance to Little Traverse Bay, the decision was taken on incomplete site evidence, and neglected to adapt the plant operations to the established environmental-ecological systems. It was assumed local currents generally swept northwestward to the open lake; instead local surface and mid-depth currents move eastward toward the head of the bay concentrating the effects of thermal input. It was also assumed the waters of Little Traverse Bay were among the coldest waters of the lake; however, during the summer of 1970 the near-shore and upper layers of the bay waters warmed more quickly and maintained higher temperatures for longer periods than did the waters near Chicago. By failing to carry out complete geological and environmental investigations prior to locating and designing the Big Rock Plant, Consumers Power Company is contributing directly to the accelerating decline of water quality in Little Traverse Bay.

Throughout this thermal pollution controversy, there has been general acceptance of the theory that waste heat from an industrial operation can be quickly and safely transferred to the atmosphere from the limited area of a near surface discharge plume. In fact, during those days and months when the air is warmer than the water, heat goes from the air into the water and is stored there.

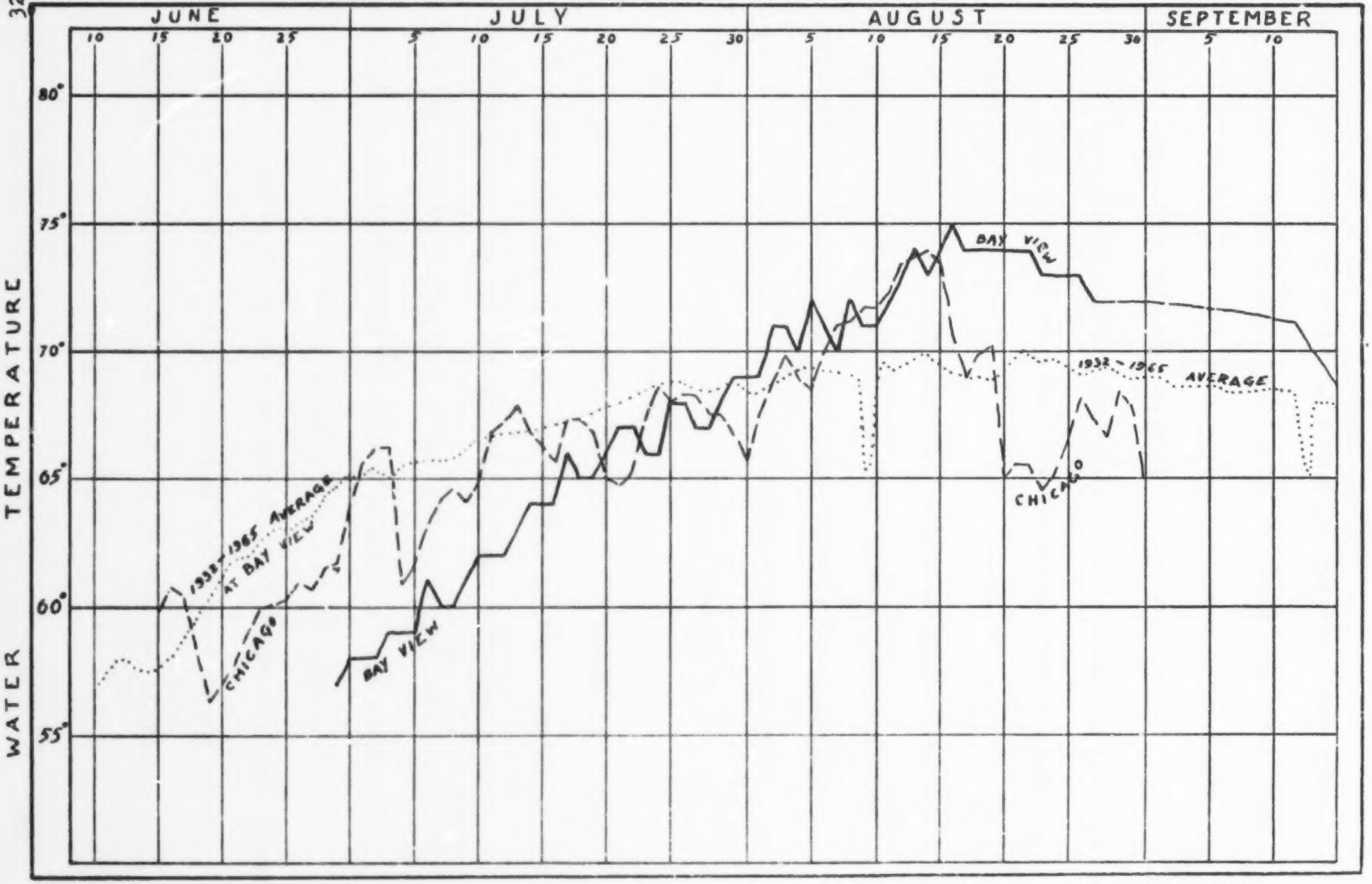
At such times thermal input from a powerplant is also retained in the water, accelerating the rate and degree of the seasonal warming-up of the water beyond the natural limits and possibly triggering massive algal bloom. Conversely, when the air temperature drops below that of the water, heat moves from the water to the atmosphere. This heat exchange system accounts for the normal spring and fall turnovers in the lake with the addition of oxygen to the bottom waters. In the Lake Michigan region, this means that for the 6 months, November through April, industrial heat discharged into the lake will be quickly relayed to the cold air not seriously affecting water quality, though it will affect ice cover. However, during the 6 months, May through October, industrial heat discharged into the lake is banked there and seriously affects water quality negatively.

I had hoped to have the projector again today but it is not here. The Board does have copies of Figures 1 and 2. (See pp. 328 and 329.)

Figure 1 shows a day-by-day temperature graph for June 29 - August 29, 1970, with records obtained from the Central Water Filtration Plant in Chicago, and from 50 feet off the end of the Bay View dock in Little Traverse Bay. The solid line is the Little Traverse Bay

FIG. 1. WATER TEMPERATURES IN SOUTHERN LAKE MICHIGAN AND LITTLE TRAVERSE BAY

1970



Prepared by: EDITH M. McKEE, C.P.G.
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CHICAGO ILLINOIS

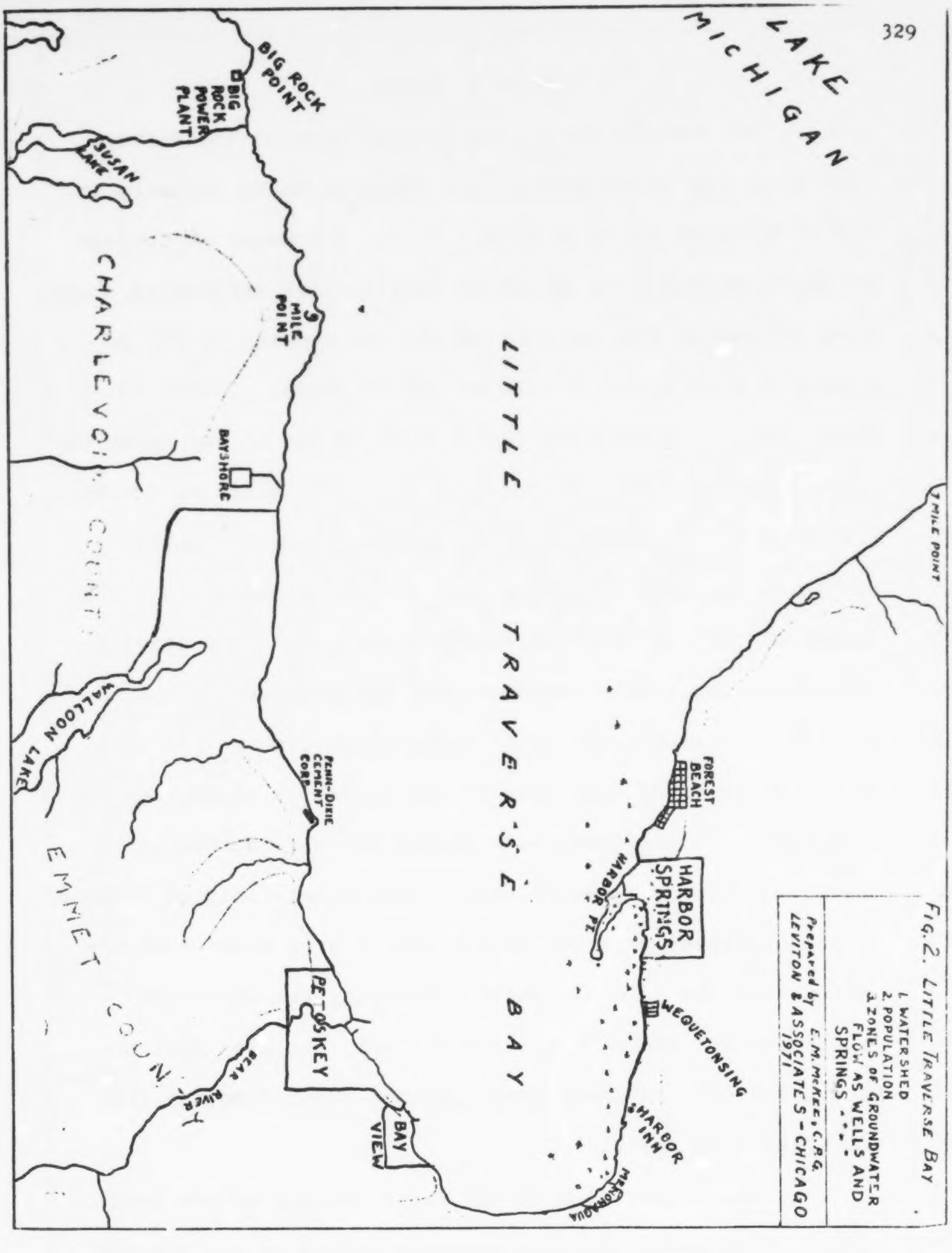
LAKE MICHIGAN
BIG ROCK POINT
BIG ROCK POWER PLANT
SUSAN LAKE
CHARLEVOIX COUNTY
9 MILE POINT
BAYSHORE
WALLOON LAKE
PENN-DIXIE CEMENT CORP.
LITTLE TRAVERSE BAY
7 MILE POINT
FOREST BEACH
HARBOR PT.
HARBOR SPRINGS
WEQUETONSING
HARBOR INN
MENONAQUA
EMMET COUNTY
PETOSKEY
BAY VIEW
BEAR RIVER

Fig. 2. LITTLE TRAVERSE BAY

1. WATERSHED
2. POPULATION
3. ZONES OF GROUNDWATER FLOW AS WELLS AND SPRINGS ·.·.·

Prepared by E. M. McKEE, C.P.G.
LEVITON & ASSOCIATES - CHICAGO
1971

record; the dashed line is the Chicago record; the dotted line shows the usual temperature range known to swimmers in Little Traverse Bay from 1932 - 1965. The water at Chicago gradually warmed in a series of oscillations reflecting short-term effects of wind on surface waters, peaking at 74° on August 14 with August 6 - 16 at 70° or above. That's 10 days. In Little Traverse Bay over 300 miles to the north the water steadily warmed more quickly than the water at Chicago, exceeding 70° on August 2 and remaining above 70° until September 14, with a maximum peak of 75° on August 16. This 6-week plateau of water temperature above 70° is a startling phenomenon for Little Traverse Bay, as indicated by the dotted line showing the usual temperature pattern for that region as observed over some 33 years, during which time the daily water temperatures were posted for the benefit of swimmers. Little Traverse water temperatures started dropping in mid-September when the severe fall storms moved over the region with the cold air masses reversing the heat flow pattern so the stored heat from the sun, Big Rock Nuclear Plant, and the few local sewer systems started moving from the water into the air.

Coincidental with the rapid cooling of the surface waters in September was the thorough mixing of surface and deep waters in the bay due to the fall turnover and an abrupt improvement in the water quality. When I first observed the Little Traverse Bay waters last year on June 9th, there was already such an excessive algal bloom that visibility was only a couple of inches as opposed to the 30 - 50 feet usually seen there as recently as 1965. By October 22, when I returned to northern Michigan, water temperature at the Bay View dock had dropped to 55° and the water was crystal clear with visibility 50 feet. Water temperature rise or fall appears to be a critical factor in controlling algal growth; in the spring additional heat input from industrial sources such as the Big Rock Plant can trigger early and excessive growth when threshold temperatures conducive of plant growth are exceeded.

During the summer of 1970 there was so much algae, identified as short strand Cladophora, growing on the bottom of Little Traverse Bay and torn loose to float in the water that waves breaking on shore looked like a vegetable soup and both the beach and dock were green with the debris. Cladophora is a species of algae which thrives where it can attach itself to rock outcrops, such as the Traverse limestone forming the bottom and shore of the southern half of Little Traverse Bay. Cladophora thrives in water where the dissolved oxygen content is low due to accelerating heat in-put and storage, and where nutritives are present.

Miss E. McKee

In the October meeting of this Board Mr. Fetterolf suggested that the occurrence of Cladophora in Little Traverse Bay might be due to increased nutritives derived from increased sewage and farm runoff, and near the Big Rock Nuclear Plant, to the sea gulls resting on rock spits projecting into the bay. On the contrary, the evidence shows that prior to 1965 there was a large gull population around Little Traverse Bay and very little algal growth. The gulls nearly disappeared from the scene between 1965 and 1970, during which time there has been accelerating growth of various species of algae in the bay including Cladophora. It was only in the summer of 1970 that gulls returned to the bay in numbers, to the region, to rest on the shore and headlands and add a small amount of pollutants to the water.

Figure 2 presents facts concerning the lack of farm runoff to enrich the bay waters, the declining population around the bay, and improvements of sewage systems around the bay. Since Mr. Fetterolf in October expressed belief that farms, population growth and poor sewage systems around Little Traverse Bay were responsible for the accelerating decline in water quality these facts should be presented to you. Bedrock geology and overlying glacial till determine the watershed draining into Little Traverse Bay; this watershed is so narrow that little or no farmland is included and the land close to the water is not suitable for farming, being limestone outcrops, sand and rocks, cedar swamp, or sand dunes. The only river of any size entering the bay is Bear Creek which flows into the Petoskey harbor; this river is stained from the cedar swamps, where springs provide the water supply, and carries silt from the glacial till upstream, but is not heavily loaded with detergents and nutritives. Other small and short streams flowing into the bay originate from springs developed from aquifers within the till or from bedrock aquifers.

Concerning population figures, I quote from a Population Analysis Report prepared for the Emmet County Planning Commission in November 1969: "Emmet County's population in 1960 was lower than it was in 1950 ... the County's population in 1930 was only slightly lower than the 1960 total ... Emmet County reached its peak population in 1910, and the 1900 level was 27 persons higher than in 1960." Petoskey is the largest city on the bay; Harbor Springs is number two and the only other community of a size to be important to the regional water quality. About these communities the Planning Commission says: "Harbor Springs maintained a near static population level in the past four Census periods ... the rate of population change (between 1930 and 1960 totals) measured less than 1 percent.

Miss E. McKee

... Population growth in Petoskey continued at a moderate pace from 1930 to 1950 (5 to 7 percent for the 20 years). Between 1950 and 1960, the population decreased by 330 persons, a 5 percent decline." Harriet Kilborn, Emmet County Clerk, tells me the present population of Petoskey is just under 7,000, an increase of about 150 from the 1960 figure. Summer residents in the resorts around the bay have dropped by about 200 in Bay View, with the closing of the summer school branch of Albion College; by about 250 in Wequetonsing; and another 250 on Harbor Point, when the two large hotels were torn down in 1964 and 1965. There has been a static number of transient summer visitors due to limited hotel, motel, and other living accomodations. Therefore, we see that the 1970 population around the bay has slightly declined since 1960.

Now for the sewage systems around the bay. Petoskey has for many years had primary and secondary settling and treatment systems; currently they are building a tertiary system. In 1965 the resort of Bay View closed down their system which returned raw sewage to the bay and hooked into the Petoskey collection system. The resort of Wequetonsing operates a 1930 system consisting of a holding tank and chlorination with frequent testing of the effluent. In Harbor Springs new sewers were laid in 1963; in 1965 the heavy load of 1,500,000 excess gallons of pure spring and well water each day which had been going through the treatment plant was diverted into storm sewers so the effective chlorination of the real sewage load was considerably increased. Harbor Point has always maintained its own treatment plant. Since 1965 there has been considerable improvement in local sewage systems with a simultaneous drop in raw sewage input into Little Traverse Bay, but the water quality continues to worsen markedly.

Considered from all angles, I repeat what I told you on October 2nd. The only observed major change which can be recognized as not improving the environment has been the introduction of the thermal plume from the Big Rock Nuclear Plant. The plant began operating in 1963; by 1965 startling growths of algae and weeds of various kinds were reported from east of Petoskey and in Harbor Springs. In 1969 large masses of free-floating algae appeared. In 1970 the entire near shore bottom was densely covered with algae, and broken pieces filled the water to the point where water clarity was zero during the summer months. In winter the plume can be clearly seen because the ice does not form in the warm water and it is now possible to fish from boats all winter in the plume. It appears that by using cooling towers or pools during the warm months, and putting the heated water into the bay during the cold months this company and others could avoid contributing to the environment-ecology deterioration.

Learning from this pilot study of the Little Traverse Bay area and from the evidence presented at those hearings, it is obvious that basic research in all aspects of the geology, meteorology, and biology related to each lake or river system are needed before adequate recommendations for building and operating a nuclear powerplant can be made. Prior to permitting the construction and operation of such a plant it is essential that such studies be submitted to a knowledgeable board showing precisely how the proposed thermal discharge will react with the entire lake system. Theoretical models of part of the system will not suffice; adequate field studies can demonstrate precisely what impact a thermal plant will have in both the environment and the ecology. It is not enough to show backyard studies of the small area adjoining the plant properties. Air and water both move across manmade boundaries and operate in systems of their own devising. By using cooling tanks or towers or refrigerants during the months when heat is being stored in the water, excessive damage can be averted; by putting the heated waters directly into the water during months when heat is being released from the water to the air the problem of dangerous onshore fogging can be avoided. For many years industry has used cheap gas as fuel during warm months when homes did not need it for heating, and reverted to coal for fuel when gas was needed for householders. The electric companies can also have seasonal disposal programs and still operate at a profit.

Thank you. Are there any questions?

(Miss McKee's background brief may be found on pp. 338 - 340.)

MR. STEIN: Thank you very much for a very interesting paper, Miss McKee.

Are there any comments or questions?

MR. PURDY: Mr. Stein.

MR. STEIN: Yes.

MR. PURDY: Miss McKee, have you studied the plume from the Big Rock powerplant?

MISS McKEE: Last April, I made application to NASA for some high altitude overflights, infrared photography, etc.

It took them 9 months lacking 3 days to get a reply back saying this project was an excellent one and should certainly add their support. I have not in detail studied the plume, per se, however, I have walked the entire, say, 30 miles around the bay. Last October, when

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338

BACKGROUND BRIEF OF (MISS) EDITH M. MCKEE

1. Rated as a CERTIFIED PROFESSIONAL GEOLOGIST by the American Institute of Professional Geologists.

2. For the past twelve years has directed projects as a consulting geologist, handling a broad spectrum of geological work, including such areas as oil and ore exploration and storage, water supplies, foundation conditions, urban development, environmental use and maintenance, regional economic development and research in oceanology and limnology.

3. Since 1943 has devised ways of applying scale-controlled 3-dimensional mapping techniques to surface, subsurface and submarine mapping.

   These techniques have been recently demonstrated in the project for a detailed mapping of the bottom topography and related surface and subsurface geology of Lake Michigan and Lake Superior.

4. Prior experience:

1943-46	Military Geology Unit - U.S. Geological Survey
1947-49	Shell Oil Co., Inc. (Houston, Texas)
1949-54	Arabian American Oil Co. (Dhahran, Saudi Arabia)
1956-58	Underground Gas Storage Co. of Ill. (Joliet, Ill.)

5. Areas surveyed:

   United States, Canada, Europe, Africa, Middle East, South and Southeast Asia.

6. Areas of special interest:

   Integrated mapping of surface and subsurface geological structures, tectonics, stratigraphy, geomorphology and paleogeomorphology related to mineral accumulations and land use.

   Developing displays of geological materials in forms easily understood by geologists, other scientists and non-scientists.

7. Served as Chairman, Public Relations Committee - AIPG, where she started a program to establish professional help for the numerous elementary school teachers and students who were and are struggling to study geology without benefit of adequate training, texts or materials.

8. Listed in WHO'S WHO AMONG AMERICAN WOMEN.

9. Member of the Following technical societies:

Geological Society of America
American Geological Institute
American Institute of Professional Geologists
Illinois Section (AIPG)
Illinois Geological Society
Michigan Basin Geological Society
Great Lakes Foundation
International Association for Great Lakes Research
Marine Technology Society: Board of Directors of Great Lakes Section
  Member, National Geology and Geophysics Committee
    National Coastal Zone Management Committee
Chicago Technical Societies Council: Chairman Environment-Ecology Committee

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DETAILED MAPPING OF THE BOTTOM TERRAIN AND ASSOCIATED GEOLOGY OF THE LAKE SUPERIOR BASIN, Edith M. McKee, paper presented by invitation at the Great Lakes Symposium of the Geological Society of America, Milwaukee, Wisconsin, November, 1970.

In preparation:
Detailed Mapping of the Bottom of Lake Michigan
Detailed Mapping of the Bottom of Lake Superior
(These reports are being prepared for publication by the Geological Society of America as major reports; eventually all five Great Lakes will be done in the same manner and published.)

I went back up, I walked the shoreline between Petoskey and the Big Rock plant, and it was quite noticeable the nearer I got to the plant the more luxurious was the algal growth both as to type and to species, and since wading in the water, you can tell the difference. It got increasingly warm as I walked towards the plant. The plume was obviously coming along shore for a number of miles -- between 5 and 10 miles.

MR. PURDY: How many miles is it from the Big Rock powerplant to the Bay View Dock?

MISS McKEE: Well, now, that depends whether you are talking of walking the headlands or going in a straight line.

MR. PURDY: In a straight line.

MISS McKEE: It would be approximately 17 miles.

MR. PURDY: Now, on your Figure 1, you have used some temperature data from a Chicago intake, and then temperature data from the Bay View Dock. I imagine that from the Chicago intake now this represents the continuous records that Chicago makes of this intake temperature. Is that correct?

MISS McKEE: That is right. It came from the central filtration plant records.

MR. PURDY: From the Bay View Dock now, what does this represent?

MISS McKEE: It represents, at a distance of about 50 feet off the end of the dock.

MR. PURDY: But in the way of measurements, once-a-day, continuous --

MISS McKEE: No, it was a once-a-day project.

MR. PURDY: Now, at what depth is the Chicago intake and how far out from the shore?

MISS McKEE: That I am not certain of.

MR. PURDY: You mentioned -- it is at some considerable distance though, and at considerable depths, wouldn't you say?

MISS McKEE: I am not that acquainted with the intake here at Chicago. I did not observe it myself.

FROM THE FLOOR: About 30 feet.

MR. STEIN: Well, we will get that in order. I think Mr. Purdy's point is made. We can get the exact information.

MR. PURDY: Now, from Bay View Dock, this is fairly close to shore, and apparently a surface measurement.

MISS McKEE: No, it was taken down at the bottom, and because this summer I have been mapping in detail the bottom terrain of the Little Traverse Bay, I happen to know that it was taken beyond the drop-off of some of the

Little Traverse limestone formations there.

MR. PURDY: What depth would this be?

MISS McKEE: It was about 35 feet where I am told they took it.

MR. PURDY: Who took it?

MISS McKEE: The lifeguard on duty who was a college boy, a senior in Geology from Albian College.

MR. PURDY: Now, if he took it at a 35-foot depth, did he have a depth thermometer to take this?

MISS McKEE: Yes, he did.

MR. PURDY: Have you compared now the sort of temperature regime that exists along the Lake Michigan shoreline at other locations remote from any sort of waste input, waste discharge with the temperature regime of the Chicago intake?

MISS McKEE: No, I have not. There are a number of projects -- basic projects in the lake here which have not been done as, for instance, for my own work I know that in Lake Michigan itself only the mid-lake high area, Little Traverse Bay since last summer, and I understand Green Bay, have the bottom depth figures in detail enough so that I can identify individual boulders and know exactly what rock formation crops out where. That leaves most of the southern basin of the lake and the northern basin of the lake with much work still to be done.

MR. PURDY: There are a number of temperature records available from Municipal water intakes, beach sampling, and so forth, and I think it would be interesting for you to look at those.

Yesterday, we made the comment that it is not unusual for the western shoreline of Michigan to have water temperatures at some distance out from shore to greatly exceed those along the eastern shorelines, due to the prevailing westerdly winds that pile up that surface warm body of water along the lakeshore. The fact is these records will show with a wind change that you can have a 15° temperature drop along the Lake Michigan shoreline overnight. Unfortunately I have experienced this several times in taking my family over to Muskegan to a State park there, and it seemed that I managed to hit those days when the water temperature is about 55 or 60° on the 2nd of August and that is just not my swimming temperature.

MISS McKEE: I agree. I have met the same thing. In fact, the first time when I met that in Little Traverse Bay unwittingly the skipper had dropped a monkey wrench overboard in about 30 feet of water and said, "Go on down and get it." The day before it had been about 68°. That day we had the effect of about 3 strong days of east wind. The temperature was down below 50°. I sympathize with you.

MR. STEIN: The people in Maine think that is warm actually. (Laughter)

MISS McKEE: But look at the winters they go through.

MR. STEIN: That is right.

MR. PURDY: It just seems to me that there is a great deal of more information that is available that could be used to confirm, strengthen your conclusions, or possibly modify them, and I think that you have reached some very firm conclusions on a study in an isolated situation where you have not used some controls to determine the validity of your conclusions.

MISS McKEE: This was not intended as a complete and total environmental study up there. To begin with, as I said, this had no funding, no financial backing, but I have been concerned because of the lack of work done in Little Traverse Bay, and since I was up there this summer, I took the opportunity of expanding and putting down and collecting whatever data was available up there.

MR. PURDY: Actually I think more work has been done in Little Traverse Bay than in many other areas on the lake. There is a sea grant program going on at the

University of Michigan now. There has been a great deal of work done up there.

MISS McKEE: I was out on the University of Michigan ship this summer. They went over to Grand Traverse where they are concentrating with their sea grant program. But this past summer they had the Inland Seas based up at Harbor Springs by taking biological tests at Nine Mile Point which is a few miles east of Big Rock.

MR. PURDY: Right.

MISS McKEE: And I was aboard one day and I took temperatures over there at a depth of 71 feet. And I was still getting temperatures above 65°.

MR. PURDY: Now, from the standpoint of the growths, I think that some of the things that you have reported here from the standpoint of the conditions worsening, and again you have looked at an isolated situation, and have not used some outside controls you might have used, confirms an earlier conclusion of this Conference. Earlier in this Conference we presented information to show how the algae and Cladophora growth situation on the entire Lake Michigan shoreline, along western Michigan, has continued to worsen through the years, and this is one of the reasons this Conference, I believe, reached the conclusion that nutrient removal was necessary from all sewage treatment plants, and again I must point out that near the locations that you are reporting from extremly heavy nuisance conditions, that we do have sewage treatment plant effluents there, and the purpose for the tertiary treatment -- the so-called tertiary treatment at Petoskey nutrient removal is to improve that condition. The Wequetonsing one that you called a holding tank is, in effect, I believe, a septic tank for chlorination, and one that we consider totally inadequate and must be replaced. But, again, I think yourobservations there confirm what is taking place along the entire shoreline of Lake Michigan and may not be traceable to thermal inputs but to a continued buildup of nutrients in the lake.

MISS McKEE: I agree that there are many aspects and many factors of this, but it still is obvious that after the fall turnover when the water temperature was on its way down, it had peaked up in the summer heat and was definitely going down. The water had cleared up.

MR. PURDY: Do you say that turnover takes place in September?

MISS McKEE: It takes place up in that part when we begin having our heavy fall storms, and the cold air moves down, which removes heat from the upper surfaces of the water, so that the warmwater begins to get denser and sinks, and the water which has not been that cool below it rises, and eventually there is a turnover, the so-called fall turnover of the water in the basin.

MR. PURDY: Thank you.

MR. STEIN: Thank you.

MR. BLASER: May I have a question? I need some clarification.

In the charts, you show the 33-year average ending in 1965, then you show the Bay View data as running warmer than the 33-year average. Do I take your remarks to attribute that increase to the thermal discharge there? You show the contrast between the 33-year average and your data.

MISS McKEE: Yes.

MR. BLASER: And you do attribute that to the nuclear plants, the thermal discharge?

MISS McKEE: I believe that the thermal input from the nuclear plants certainly contributes to it.

MR. BLASER: That plus, I assume, the sewage discharges and such.

MISS McKEE: In the bay, the sewerage discharges have been improved consistently since 1965.

MR. BLASER: In terms of temperature. This is a temperature chart.

MISS McKEE: I don't believe the sewage input had a determination on the temperature prior to the -- well, 1967 or so.

MR. BLASER: Okay. The question that really is in my mind: If you attribute the higher temperature above average to the thermal discharges, I notice in the same year, the 6 or 8 weeks preceding this deal with two 6-week segments, Bay View is running colder than the 33-year average. Do you attribute this to the thermal plume?

MISS McKEE: What I do know about the 33-year average -- usually by the 1st of July, the temperature had hit 65°. Anything below that and very few swimmers.

This year when we measured it, it was colder and lower. Whether there is an intensification prior to this time, there had been an active release of heat into the air, I don't know.

MR. BLASER: This question that is in my mind is: What do you attribute, when the data runs ahead of the base, you seem to attribute it to the thermal discharge, when it runs behind you do not. Could you help clarify that for me?

MISS McKEE: As I said, I don't know. I didn't get up there this past summer and start these proceedings, temperature readings, until late June.

MR. BLASER: Well, it was late June data that

I am referring to here -- June, July.

MISS McKEE: There is a natural input from the sun. It would depend somewhat on the meteorology, the season, how much sun there was, how much wind there was, how much mixing of the water there was. I put the 33-year average in as a control because prior to -- well, at least 1970, and possibly 1969, if it had hit the 70° two days in an entire summer, it was unusual, most unusual. And in 1970, when we had 6 weeks above 70° and hitting 75°, that is unheard of in that area.

These are not presented as complete data, no. As I said, this was an offshoot, a spin-off from other work I was doing. But it is a very definite change in the water quality in Little Traverse Bay that has been noted and documented, as of 1970, and it has been accelerating since 1965.

MR. BLASER: Thank you.

MR. STEIN: Are there any more comments or questions?

Let me make a comment on this, because Miss McKee, I think you have done a very good job, since the last time, but I had without communication with Mr. Blaser the same kind of question on your chart. Now, I ask you to look at that Figure 1, and there may be an explanation, because

I think you have raised some very interesting possibilities. The question, I think, that probably Mr. Blaser and Mr. Purdy have raised is whether the material you have presented backs this up.

Let's look at your average. There is one chart, a dotted line, which shows the average temperature from 32° to 65°. About half your line for the Bay View temperature for 1970 is below the chart.

MISS McKEE: Right.

MR. STEIN: About half that, starting toward the end of July is above it.

Now, there is about just as much of your 1970 figures below the line as above the line. Now, given this kind of situation, how can we attribute, if you do, a causal effect to the reason above the line, when just as much goes below the line, not to say it isn't a natural variation.

I think this is the gap that we have to close if we are going to look at this, and I just ask you to look at this as -- I am not trying to raise a point on your proposal, but I ask you to look at this as a presentation.

In other words, I am sure that Mr. Blaser -- and I believe you are a lawyer, aren't you?

MR. BLASER: No.

MR. STEIN: No, he isn't.

But I think if I were a lawyer on cross -- and I am -- on cross examination, this would be the point you would hit at. I am not talking necessarily in terms of your result, but in terms of the presentation.

MISS McKEE: I see. Well, I have been presuming on the presentation that I made in October, giving you gentlemen the entire history of the development of the Great Lakes Basin and the Lake Michigan Basin, per se, and I assumed that you were familiar with the ice cover which is at the northern end of the lake. Little Traverse Bay still has ice cover over it.

The only open water would be where the strong currents are around Harbor Springs, Harbor Point, where there is wet storage of the boats over in Harbor Springs, and the fishing in the plume from the Big Rock plant. The water in Little Traverse Bay starts lower for a longer period of time than it does at the south end of the lake here in Chicago. In other words, it has to wait until the ice gets out, before the heat from the sun can begin going into it and already the nuclear plant plume is in there before the sun can get in.

MR. STEIN: I understand that, but that should be reflected on the average through the year.

This is going to be kind of a law question. Is it your professional opinion, that the heat discharge from the Big Rock nuclear plant is the causative agent in changing the character of the water in Little Traverse Bay so as to create the condition of algae and Cladophora that you have seen?

MISS McKEE: In my opinion, from what I have seen and the professional work I have done, it is a major factor. It is not the sole factor, but it is the major factor.

MR. STEIN: Right. Thank you.

Are there any other questions or comments?

Thank you very much.

MR. BLASER: The next one is Dr. John Langum, please, President of Business Economics.

Mr. Langum.

STATEMENT OF DR. JOHN K. LANGUM, ECONOMIC
CONSULTANT, PRESIDENT OF BUSINESS ECONOMICS,
INC., CHICAGO, ILLINOIS

DR. LANGUM: Mr. Chairman, Members of the Conference, ladies and gentlemen. My name is John K. Langum. I am an Economic Consultant with offices located here in Chicago at 209 South DeSalle Street. I have prepared a statement of my qualifications in the field of economics which I believe has been distributed to the members of the Conference. (See pp. 355 - 366.)

I do not appear before you as a physical scientist or as an engineer. I cannot testify as to damage to the lake or in terms of the engineering requirements what should be done about it.

I am here in two capacities. First as an economist. Much of my work is in the field of advising major institutional investors in this country and Canada on the impact of changing economic conditions on the credit and capital markets. The other specialty that I have is

Q. Will you state your name, please?

A. John K. Langum

Q. Where do you live?

A. I live at 1186 Duncan Avenue, Elgin, Illinois.

Q. What is your present occupation?

A. I am an economic consultant, with my offices located at 209 South LaSalle Street in Chicago, Illinois. My work consists of advising and counseling with a wide range of business firms and financial institutions on economic matters of concern to them. Much of my work lies in the field of appraising changes in business conditions and their impact on particular firms and industries and in the field of interest rates, the money market, and the capital markets. My clients include some of the largest firms and most prominent trade associations in the fields of investments, banking, industry, transportation, and public utilities.

In addition, I am President of Business Economics, Inc., an enterprise engaged in research and publications in the field of business and economics. Business Economics, Inc. provides a continuing service for financial institutions and business enterprises covering in depth the forces at work in the American economy and their significance for the credit and capital markets.

Q. What is your educational background?

A. In 1933, I received a B. A. Degree from Colorado College. In 1936, the University of Minnesota awarded me an M. A. In 1943, the University of Minnesota conferred on me the Ph. D. Degree.

Q. What academic positions have you held?

A. From 1935 to 1940 I was on the faculty of the School of Business Administration at the University of Minnesota. In 1940 and 1941, I was lecturer in Economics at the University of California. In 1945 and 1946, I was part-time lecturer in the Department of Economics at the University of Chicago. In the summer of 1947, and again in the summer of 1951, I was visiting Professor of Economics at Northwestern University.

From 1951 through 1962, I served as professor of Business Administration, on a part-time basis, in the School of Business of Indiana University.

Q. What connections have you had with graduate schools sponsored by banking and financial associations?

A. For the last twenty years, starting in 1951, I have been a member of the faculty of the Stonier Graduate School of Banking at Rutgers University in New Brunswick, New Jersey, sponsored by the American Bankers Association. Here in June of each year, I give lectures on the business outlook and the credit and capital markets for the bank officers enrolled in the Graduate School. Each year about 1,200 bank officers, from most of the fifty states and from several foreign countries, attend the Graduate School of Banking.

In 1945, I was one of the founders of the Graduate School of Banking at the University of Wisconsin, located at Madison, Wisconsin. That school, with over one thousand bank officers from about thirty-five states, is sponsored by the Central States Conference of sixteen midwestern state banking associations. For twenty-six consecutive years, since the beginning of the Graduate School, I have given the basic lectures on the money markets.

Since 1955, I have lectured on appraisal of the economic outlook, analysis of the individual company and industry in relation to changing business conditions, and the structure and workings of the capital markets at the School of Banking of the South in Baton Rouge at Louisiana State University. This graduate school for bank officers is sponsored by fifteen southern state banking associations, including the Alabama Bankers Association.

In several years, I have also lectured at the Graduate Southwestern School of Banking held in Dallas, Texas, at Southern Methodist University; at the National Trust School held in Evanston, Illinois, at Northwestern University;

at the Pacific Coast School of Banking held in Seattle, Washington, at the University of Washington; and at the Graduate School of Savings and Loan held in Bloomington, Indiana, at Indiana University.

In many years, I have been lecturer at the Life Officers Investment Seminar, sponsored by the American Life Convention; and at the Financial Analysts Seminar, conducted by the National Federation of Financial Analysts Societies in association with the University of Chicago.

Q. What business experience have you had?

A. From 1941 until 1951, I was employed by the Federal Reserve Bank of Chicago, and from 1944 to 1951, I was Vice President of the Bank. As officer in charge of the Research Department during that period, it was my responsibility to direct an extensive research program in monetary and fiscal problems, in the banking mechanism, in business conditions, in agricultural and business economics, and in business finance. Also, at the bank I was in charge of its bank and public relations activities. In addition, for seven years I was associate economist of the Federal Open Market Committee of the Federal Reserve System. This is the body in the Federal Reserve System, made up of members of the Board of Governors and Presidents of the Federal Reserve Banks, which determines the monetary and credit policies of the nation's central banking system.

Since 1951, I have been engaged in private business as an economic consultant. I am a director of Selected American Shares, Inc., Selected Special Shares, Inc., and Selected Opportunity Fund, Inc., common stock investment funds with offices in Chicago, Illinois. I am a director of Founders Growth Fund, Inc., (formerly Gryphon Fund, Inc.,) a common stock investment fund with offices in Denver, Colorado. Since February 1, 1969 I have been President of Founders Growth Fund, Inc. I am a director of First Federal Savings and Loan Association of Elgin, Illinois. For several years, until late in 1964, when the company was sold to Transamerica, I was a director of Bankers Mortgage Company of California, a mortgage banking firm with offices in San Francisco, California, and in New York City.

Q. Have you previously testified in rate cases?

A. Yes. I have testified in a number of cases before public utility commissions and courts in twenty-four states and the District of Columbia, including Illinois, Indiana, Iowa, Michigan, Wisconsin, Massachusetts, Ohio, Pennsylvania, Kansas, Missouri, Kentucky, Tennesse, West Virginia, Maryland, Louisiana, Alabama, Mississippi, Arkansas, Florida, Montana, Utah, Oregon, Washington, and California. I have testified before the Interstate Commerce Commission, the Federal Maritime Commission, and the Federal Power Commission. In Canada, I have testified before the Board of Transport Commissioners and my studies have been presented to the National Energy Board.

Q. Are you the author of any articles and books?

A. During the last thirty years I have had many articles published in leading economic and business journals. For ten years, from 1941 until 1951, I edited "Business Conditions", a monthly review published by the Federal Reserve Bank of Chicago. For fifteen years, from 1946 through 1960, I wrote the articles on banking, including investment banking and commercial banking, on the Federal Reserve System and other financial subjects for the Encyclopedia Britannica Book of the Year. I write the articles on savings banking and on savings and loan associations for the Encyclopedia Britannica.

During the last several years, several interviews with me on the business outlook and on investment policy have been published in Time, in U.S. News and World Report, and in Business Week.

Q. Are you a member of and have you participated in professional societies and civic activities?

A. Yes. I am a member of several professional societies and have been active in many of them over several years.

On many occasions I have been on the programs of the Conference of Business Economists, the National

Association of Business Economists, the National Industrial Conference Board, the National Tax Association, the American Economic Association, and the Financial Analysts Societies.

In June, 1957, I testified before the Joint Economic Committee of Congress at their invitation on the bearing of the budget outlook and economic situation on growth and inflation in the American economy. In August, 1962, I again testified before the Joint Economic Committee on Corporate Profits, Cash Flow, and Rate of Return.

In 1963, 1964 and 1969 I participated in the symposiums on economic growth and public policy in Washington, D. C., sponsored by the American Bankers Association. In 1962 I participated in the conference on fiscal and monetary policy sponsored by the President's Advisory Committee on Labor-Management Policy. In 1962 I participated in the White House Conference on national economic issues.

Early in the postwar period, I served on the research staff of the Committee for Economic Development.

For three years, from 1959 through 1961, I served as Vice President of the Chicago Association of Commerce and Industry in charge of the work of the Association in business research and statistics. For six years, I served as a director of the Association.

From 1951 through 1953, I served on the Committee on economic policy of the Chamber of Commerce of the United States.

In 1964, in my professional capacity, I prepared a study for the City of Chicago on "Implications of Technological Development for the Economy of Chicago."

For fifteen years I have been Chairman of the Elgin Plan Commission in the city in which I live, and I am a member of the American Society of Planning Officials.

I am President of the Fox Path Association, Vice-Chairman of the Lake Michigan Federation, and Director of the Illinois Planning and Conservation League. I am a life member of the Sierra Club and a life member of The Wilderness Society.

In 1958 I was made a fellow of the American Association for the Advancement of Science.

PUBLIC UTILITY CASES SINCE JANUARY 1, 1967 IN WHICH DR. JOHN K. LANGUM HAS TESTIFIED REGARDING COST OF CAPITAL AND RATE OF RETURN

	1967
Telephone	Indiana Telephone Corporation Public Service Commission of Indiana Cause No. 31275
Water	Davenport Water Company Iowa State Commerce Commission Docket No. U-138
	1968
Gas Pipeline	Natural Gas Pipeline Company of America Federal Power Commission Docket No. 68-17 and Docket No. RP67-21
Telephone	United Telephone Company of Indiana Public Service Commission of Indiana
Electric and Gas Distribution	Montana Power Company Public Service Commission of Montana Docket No. 5698
Telephone	Illini State Telephone Company Illinois Commerce Commission Docket No. 54257
Telephone	Kansas Telephone Company State Corporation Commission of Kansas Docket No. 84, 317-U
Water	St. Louis County Water Company Public Service Commission of Missouri Case No. 16, 563
Water	St. Joseph Water Company Public Service Commission of Missouri Cause No. 16, 453

Water	Joplin Water Works Company Public Service Commission of Missouri Cause No. 16454
Electric and Gas Distribution	Consumers Power Company Michigan Public Service Commission Case No. U-3110 and Case No. U-3179
	1969
Gas Distribution	Laclede Gas Company Public Service Commission of Missouri Case No. 16,689
Telephone	Missouri Telephone Company Public Service Commission of Missouri Case No. 16,662
Telephone	Bell Canada Canadian Transport Commission, Railway Transport Committee File C. 955,178
Gas Distribution	Central Illinois Light Company Illinois Commerce Commission Docket No. 54853
Water	Indianapolis Water Company Public Service Commission of Indiana Cause No. 31949 and Cause No. 31953
Water	Northern Illinois Water Company, Champaign Division Illinois Commerce Commission Docket No. 54850
Telephone	Illini State Telephone Commission Illinois Commerce Commission Docket No. 54257 Rehearing
Water	Alton Water Company Illinois Commerce Commission Case No. 54765
Water	East St. Louis and Interurban Water Company Illinois Commerce Commission Docket No. 54992

Gas Pipeline	Natural Gas Pipeline Company of America Federal Power Commission Docket No. RP69-36
Water	City Water Company of Chattanooga Tennessee Public Service Commission Docket No. U-5232
Water	Northern Illinois Water Company Sterling Division Case No. 55111
	1970
Telephone	Ohio Bell Telephone Company Public Utilities Commission of Ohio No. 35,959
Water	South Pittsburgh Water Company Pennsylvania Public Utility Commission C. 18807 et al
Telephone	Michigan Bell Telephone Company Michigan Public Service Commission Docket No. U-3204
Water	Missouri Water Company Missouri Public Service Commission P.S.C. Case #16,941
Electric	Commonwealth Edison Company Illinois Commerce Commission Docket No. 55149 (On behalf of Attorney General of State of Illinois)
Gas Pipeline	Natural Gas Pipeline Company of America Federal Power Commission Docket No. RP70-35
Electric	Wisconsin Electric Power Company Federal Power Commission Docket No. E-7546
Electric	Consumers Power Company Michigan Public Service Commission Case No. U-3749

1971

Water	West Virginia Water Company Public Service Commission of West Virginia
Electric	Alabama Power Company Alabama Public Service Commission Docket No. 16359

consultation and expert testimony on financing of public utilities, cost of capital and fair rate of return of public utilities. You will see in my qualifications that over the years I have testified as an expert witness on cost of capital and fair rate of return before commissions and courts in the District of Columbia, some 24 States, all the leading Federal regulatory bodies, and the leading Dominion regulatory bodies in Canada. There is attached a specific list of cases in which I have testified, and jurisdictions -- some 33 cases during the last 4 years -- on cost to capital and fair rate of return. I might state those have all been on behalf of the public utilities involved except for one. Last year I testified for the Attorney General of Illinois against Commonwealth Edison in their rate case.

The second occasion or matter in which I am here is as a concerned citizen. It is my philosophy that if we do not really know the possible damage to Lake Michigan from thermal discharges, we should not permit such thermal discharges. That is a matter of philosophy and approach rather than a statement as a scientist or as an engineer.

Now, I have prepared a very brief statement which I am going to read and make certain additions to, and I have also prepared a few pages of exhibits to which

I should like to refer as I proceed through the statement. My statement, as you will note, is about the economic considerations regarding thermal discharge standards for Lake Michigan for major electric utilities.

Economic considerations should be no bar to effective actions by the appropriate regulatory authorities which substantially eliminate thermal discharge of heated water into Lake Michigan by electric generating plants.

The price of electricity has shown almost no net increase or a very small net increase during the past years of inflation in the American economy. In these circumstances it seems to me it would be inexcusable if regulatory authorities and electric utilities failed to set the price of electricity so as to cover the full costs of its production, including adequate safeguards against damaging impact on water, air, and land.

Now, if I may refer to the first two pages of the exhibit material, what is shown as page 1, and up at the top is listed Table 1, National Rated Average Bill for Residential Service, 1935 to 1969. These data are from the Federal Power Commission and are copies from their latest report on this, the annual volume, typical electric bills 1969. (See pp. 369 - 386.)

You will note the footnote or the comment at the

TABLE 1—NATIONAL WEIGHTED AVERAGE BILLS FOR RESIDENTIAL SERVICE, 1935–1969

[Cities of 2,500 population and more]

Date	Average bill					Average charge per kwh					Index of average bill				
											(1957–59=100)			(1964=100)	
	100 kwh	250 kwh	500 kwh	750 kwh	1,000 kwh	100 kwh	250 kwh	500 kwh	750 kwh	1,000 kwh	100 kwh	250 kwh	500 kwh	750 kwh	1,000 kwh
						Cents	*Cents*	*Cents*	*Cents*	*Cents*					
Jan. 1, 1969	$4.05	$7.40	$10.32	$13.97	$18.03	4.05	2.96	2.06	1.86	1.80	102.3	100.9	98.3	96.3	95.6
Jan. 1, 1968	4.03	7.38	10.37	14.16	18.27	4.03	2.95	2.07	1.89	1.83	101.8	100.7	98.8	97.6	96.9
Jan. 1, 1967	4.03	7.37	10.37	14.21	18.32	4.03	2.95	2.07	1.89	1.83	101.8	100.5	98.8	97.9	97.1
Jan. 1, 1966	4.00	7.34	10.34	14.19	18.32	4.00	2.94	2.07	1.89	1.83	101.1	100.1	98.5	97.8	97.1
Jan. 1, 1965	4.02	7.38	10.41	14.34	18.59	4.02	2.95	2.08	1.91	1.86	101.6	100.7	99.2	98.8	98.6
Jan. 1, 1964	4.03	7.43	10.61	14.51	18.86	4.03	2.97	2.12	1.93	1.89	101.8	101.3	101.1	100.0	100.0
Jan. 1, 1963	4.06	7.48	10.64	14.66	----	4.06	2.99	2.13	1.95	----	102.6	102.0	101.4	101.0	----
Jan. 1, 1962	4.06	7.48	10.66	----	----	4.06	2.99	2.13	----	----	102.6	102.0	101.6	----	----
Jan. 1, 1961	4.05	7.45	10.64	----	----	4.05	2.98	2.13	----	----	102.3	101.6	101.4	----	----
Jan. 1, 1960	4.04	7.44	10.62	----	----	4.04	2.98	2.12	----	----	102.1	101.5	101.2	----	----
Jan. 1, 1959	3.98	7.36	10.51	----	----	3.98	2.94	2.10	----	----	100.5	100.4	100.1	----	----
Jan. 1, 1958	3.93	7.30	10.47	----	----	3.93	2.92	2.09	----	----	99.3	99.6	99.8	----	----
Jan. 1, 1957	3.89	7.23	10.39	----	----	3.89	2.89	2.08	----	----	98.3	98.6	99.0	----	----
Jan. 1, 1956	3.88	7.21	10.36	----	----	3.88	2.88	2.07	----	----	98.0	98.3	98.7	----	----
Jan. 1, 1955	3.86	7.18	10.30	----	----	3.86	2.87	2.06	----	----	97.5	97.9	98.1	----	----
Jan. 1, 1954	3.82	7.10	10.23	----	----	3.82	2.84	2.05	----	----	96.5	96.8	97.5	----	----
Jan. 1, 1953	3.81	7.08	10.20	----	----	3.81	2.83	2.04	----	----	96.3	96.6	97.2	----	----
Jan. 1, 1952	3.76	6.97	10.08	----	----	3.76	2.79	2.02	----	----	95.0	95.1	96.0	----	----
Jan. 1, 1951	3.74	6.95	10.02	----	----	3.74	2.78	2.00	----	----	94.5	94.8	95.5	----	----
Jan. 1, 1950	3.76	6.93	10.11	----	----	3.76	2.79	2.02	----	----	95.0	95.2	96.3	----	----
Jan. 1, 1945	3.89	7.09	10.19	----	----	3.89	2.84	2.04	----	----	98.3	96.7	97.1	----	----
Jan. 1, 1940	4.06	7.37	10.55	----	----	4.06	2.95	2.11	----	----	102.8	100.5	100.5	----	----
Jan. 1, 1935	4.67	8.91	13.87	----	----	4.67	3.56	2.77	----	----	118.0	121.5	132.2	----	----

Source: Federal Power Commission, Typical Electric Bills, 1969, page X.

DOMESTIC RATES

Comparisons of the average rate paid by domestic consumers from year to year give no adequate conception of actual rate reductions since they also reflect the fact that average consumption has increased, entitling users to the lower rates provided by promotional rate schedules. The only satisfactory measure of actual rate reductions is a comparison of the year to year cost of given quantities of electricity. Such a study has been published by the Federal Power Commission and is summarized below. In addition, there is a table showing certain data presented from the Federal Power Commission's annual publication, "Typical Electric Bills." The table shows sample residential electric bills for cities of 50,000 population and more, as well as the utilities which serve the respective communities.

Source: Moody's Investors Service, Inc., Moody's Public Utility Manual, 1970, page a20.

U.S.NEWS & WORLD REPORT

WHERE INFLATION TAKES ITS TOLL

THE PICTOGRAM on these pages shows where inflation's toll is highest—in the cost of essential services.

These services include everything from haircuts and hospital bills to taxi fares and baby-sitters' fees.

Highlighted by the chart are sharp price increases in important basic services over the past five years.

The U.S. Department of Labor each month tallies the cost of more than 80 services which are included in its consumer price index. Out of the entire roster, only two—telephone bills and television-repair charges—are lower, on the average, than five years ago. Everything else costs more.

Since 1964, prices of all the items that go into the cost-of-living index, including food, clothing and shelter, have risen 21 per cent.

Food prices are up 20 per cent, on average. Household rents are up about 12 per cent. Household furniture and appliances cost 8 per cent more.

By contrast, services of all kinds are up nearly 28 per cent in the five-year period, accounting for not quite half of the increase in the consumer price index.

Little relief is in sight. The chief reason for the sharp upward thrust in cost of services is rising wages paid to service workers.

The labor content in service industries generally runs substantially higher than in manufacturing industries. In many service fields, pay increases are already "built in" under existing contracts.

Unlike the situation in manufacturing, where investment in sophisticated equipment and machinery can help boost output per worker, there is little opportunity to improve productivity in many service lines.

A barber, for example, can give only a certain number of haircuts during the course of his working day. A piano teacher, a lawyer or a physician has fixed limits on the number of customers, clients or patients who can be served in a typical schedule.

More people in the U.S. work force already are employed in providing services than in producing goods. An official Labor Department study forecasts that, by 1975, the share of the service field will rise to nearly 60 per cent of total employment. The trend pinpoints one reason why it is so hard to bring inflation under control

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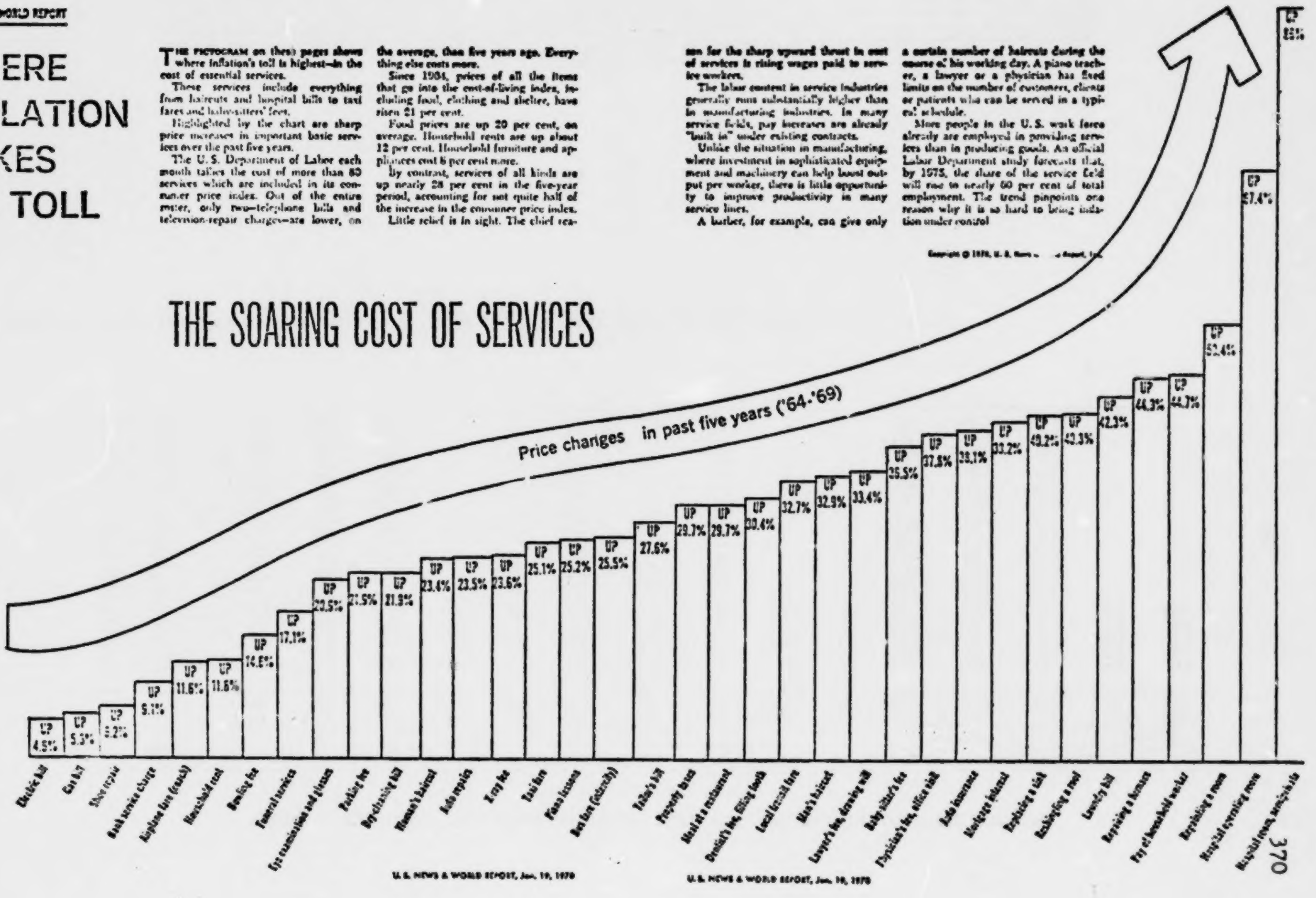
THE SOARING COST OF SERVICES



CAPITALIZATION AND OPERATING REVENUES
MAJOR ELECTRIC UTILITIES USING LAKE MICHIGAN WATER FOR COOLING
1970

	Total Capitalization December 31, 1970	Total Operating Revenues 1970	Total Electric Operating Revenues 1970
Illinois			
Commonwealth Edison Company	$2,943,838,000	$886,992,000	$886,992,000
Indiana			
Northern Indiana Public Service Company	659,032,205	299,785,164	124,513,000
Indiana & Michigan Electric Company	648,329,000	162,975,000	162,975,000
American Electric Power Company	2,869,721,000	665,667,000	665,667,000
Michigan			
Consumers Power Company	1,691,822,825	609,989,505	334,904,154
Wisconsin			
Wisconsin Electric Power Company	968,231,710	287,746,472	233,762,105
Wisconsin Power and Light Company	303,129,000	98,814,000	75,170,000
Wisconsin Public Service Company	305,365,035	102,413,060	67,143,718

INVESTMENT STATURE
MAJOR ELECTRIC UTILITIES USING LAKE MICHIGAN WATER FOR COOLING

	Senior Debt		Preferred Stock	Common Stock		
	Moody's Rating	Standard & Poor's Bond Quality Rating	Standard & Poor's Quality Rating	Moody's Quality Rating	Standard & Poor's Earnings and Dividend Ranking	Dividends Paid Each Year Since
Illinois						
Commonwealth Edison Company	Aaa	AAA	AAA	High Quality	A+	1890
Indiana						
Northern Indiana Public Service Company	Aa	AA	AA	High Grade	A	1944
Indiana & Michigan Electric Company	A	AA	NL	NL	NL	NL
American Electric Power Company	A to Aa*	A to AA*	NL	Investment Grade	A	1909
Michigan						
Consumers Power Company	Aaa	AAA	AAA	High Grade	A+	1913
Wisconsin						
Wisconsin Electric Power Company	Aa	AA	A	High Grade	A	1939
Wisconsin Power and Light Company	Aa	AA	A	NL	A-	1946
Wisconsin Public Service Company	A	AA	NL	NL	A-	1940

*Subsidiary debt

NL Not listed

Source: Moody's Investors Service, Inc., Moody's Public Utility Manual, 1970; Moody's Bond Record, January, 1971; Moody's Handbook of Common Stocks, First Quarterly 1971 Edition, Standard & Poor's Corporation, Earnings and Ratings Bond Guide, January 1971; Security Owner's Stock Guide, March 1971.

RATE OF INCOME AVAILABLE FOR CAPITAL TO AVERAGE TOTAL CAPITAL MAJOR ELECTRIC UTILITIES USING LAKE MICHIGAN WATER FOR COOLING

1963-1970

	1963	1964	1965	1966	1967	1968	1969	1970
Illinois								
Commonwealth Edison Company	7.52%	7.83%	8.17%	8.39%	8.45%	8.26%	8.00%	7.96%
Indiana								
Northern Indiana Public Service Company	7.54	7.74	8.31	8.60	8.77	8.50	8.47	9.06
Indiana & Michigan Electric Company	7.20	7.95	7.93	8.52	8.25	8.22	8.77	9.05
American Electric Power Company	7.38	7.63	7.77	8.08	8.07	8.21	8.35	8.55
Michigan								
Consumers Power Company	6.64	7.14	7.72	7.93	7.80	7.08	7.32	7.53
Wisconsin								
Wisconsin Electric Power Company	6.41	6.54	7.18	6.96	6.69	6.06	6.91	6.88
Wisconsin Power and Light Company	6.41	6.50	6.85	7.00	7.30	7.14	7.61	7.46
Wisconsin Public Service Corporation	7.42	7.02	7.12	7.02	7.10	6.62	6.72	6.88

RATE OF RETURN ON COMMON EQUITY, COMMON EQUITY RATIO, AND EARNINGS PER SHARE
MAJOR ELECTRIC UTILITIES USING LAKE MICHIGAN WATER FOR COOLING
1963-1970

	1963	1964	1965	1966	1967	1968	1969	1970
Illinois								
Commonwealth Edison Company	13.57%	13.89%	14.34%	14.80%	14.91%	14.36%	13.82%	13.16%
	39.78	41.44	42.88	42.89	41.70	40.12	37.63	34.36
	$2.20	$2.40	$2.61	$2.82	$2.98	$2.99	$3.00	$2.95
Indiana								
Northern Indiana Public Service Company	14.15%	14.56%	15.66%	16.06%	16.20%	15.45%	15.28%	16.34%
	34.70	35.51	36.55	37.90	38.47	38.06	37.98	38.24
	$1.10	$1.21	$1.40	$1.55	$1.70	$1.75	$1.85	$2.12
Indiana & Michigan Electric Company	14.67%	17.13%	17.11%	18.96%	17.69%	16.76%	17.95%	17.08%
	31.63	30.96	30.83	30.99	31.59	31.39	30.43	30.25
	$11.24	$13.72	$13.57	$15.09	$14.59	$15.02	$18.57	$21.60
American Electric Power Company	14.42%	14.91%	15.27%	15.95%	15.73%	15.42%	14.92%	14.10%
	33.73	34.40	34.92	34.10	34.01	33.14	31.41	31.08
	$1.50	$1.62	$1.73	$1.90	$2.00	$2.10	$2.20	$2.30
Michigan								
Consumers Power Company	10.79%	11.63%	12.75%	13.20%	12.84%	11.19%	11.47%	11.62%
	41.07	43.08	43.96	43.42	42.18	40.34	38.34	37.26
	$1.99	$2.25	$2.58	$2.81	$2.87	$2.60	$2.79	$2.95
Wisconsin								
Wisconsin Electric Power Company	9.69%	10.12%	10.77%	10.63%	10.43%	8.19%	9.82%	9.61%
	42.13	44.90	47.41	46.80	43.42	40.30	37.83	35.04
	$1.55	$1.76	$1.96	$2.02	$2.07	$1.71	$2.07	$2.06
Wisconsin Power and Light Company	10.53%	10.56%	11.20%	11.52%	12.38%	12.06%	12.85%	12.20%
	38.18	39.29	40.44	41.30	41.25	39.27	36.41	34.18
	$1.26	$1.31	$1.44	$1.54	$1.73	$1.75	$1.94	$1.92
Wisconsin Public Service Corporation	13.17%	12.54%	12.91%	12.52%	12.56%	11.21%	10.92%	11.33%
	37.32	36.38	36.34	37.02	36.39	34.06	31.18	29.29
	$1.33	$1.33	$1.45	$1.49	$1.57	$1.46	$1.47	$1.54

To meet the projected loads in 1990, substantial amounts of generating capacity in addition to that existing and under construction will need to be installed in the Lake Michigan area. Estimates made in connection with updating the National Power Survey indicate that approximately 4,000 megawatts of new fossil fueled capacity and 20,000 megawatts of new nuclear capacity would be constructed on or near Lake Michigan. Thus, by 1990 nearly 40,000 megawatts of steam-electric capacity could be located so as to use Lake Michigan waters for cooling.

Should the projected 24,000 megawatts of thermal capacity not now existing or under construction be required to have auxiliary cooling facilities rather than once-through systems, the additional plant costs would be an estimated $130 million, using for auxiliary facilities about $10/kW for nuclear and $7/kW for fossil plants. The added consumptive use of water would be approximately 300 cubic feet per second.

If all of the 15,000 megawatts of capacity existing and under construction required conversion from once-through cooling to the use of auxiliary cooling facilities, the required investment, exclusive of sunk costs in constructed facilities, could be of the order of $150 million, using somewhat higher unit costs than for new plants. This would not make allowance for the unavailability of capacities during conversion periods. The increase in consumptive use of water resulting from the alterations would be about 190 cubic feet per second.

Statement of Frederick H. Warren, Advisor on Environmental Quality, Federal Power Commission, for the Federal-State Enforcement Conference on Pollution of Lake Michigan, September 28, 1970, Chicago, Illinois

CONSTRUCTION EXPENDITURES
IN RELATION TO TOTAL CAPITAL EXPENDITURES OF THE ELECTRIC UTILITY INDUSTRY
MAJOR ELECTRIC UTILITIES USING LAKE MICHIGAN WATER FOR COOLING
1966-1970

(Millions of dollars)

	1966	1967	1968	1969	1970	1966-1970
Illinois						
Commonwealth Edison Company	$199.9	$249.3	$351.9	$432.5	$498.2	$1731.8
Indiana						
Northern Indiana Public Service Company	62.0	74.2	62.7	69.5	65.4	333.8
Indiana & Michigan Electric Company	22.6	38.8	67.4	116.0	153.8	398.6
Michigan						
Consumers Power Company	147.0	140.8	208.3	205.1	241.9	943.1
Wisconsin						
Wisconsin Electric Power Company	57.6	100.4	140.8	109.3	105.0	513.1
Wisconsin Power and Light Company	13.7	19.8	35.7	38.5	30.7	138.4
Wisconsin Public Service Company	14.0	24.0	35.2	36.7	40.2	150.1
Total construction expenditures Major electric utilities using Lake Michigan for cooling	516.8	647.3	902.0	1007.6	1135.2	4208.9
Total capital expenditures Electric utility industry	6345.0	7785.0	9101.0	10554.0	13000.0	46785.0
Total construction expenditures Major electric utilities using Lake Michigan for cooling as percent of total capital expenditures Electric utility industry	8.1%	8.3%	9.9%	9.6%	8.7%	9.0%

PROJECTED CAPITAL EXPENDITURES
GENERATION TRANSMISSION, DISTRIBUTION, AND MISCELLANEOUS
ELECTRIC-UTILITY INDUSTRY
1970-1990

(Millions of dollars)

Year	Total Capital Expenditures
1971	$13,025
1972	14,219
1973	15,610
1974	16,352
1975	17,152
1976	17,786
1977	18,420
1978	19,055
1979	19,690
1980	20,325
1971-1980	171,634
1981	22,106
1982	23,887
1983	25,668
1984	27,450
1985	29,232
1986	31,793
1987	34,354
1988	36,916
1989	39,478
1990	42,040
1981-1990	312,924
1971-1990	484,558

Data from or estimates based upon
Source: "21st Annual Electrical Industry Forecast,"
Electrical World, September 15, 1970, page 44.

REQUIRED INVESTMENT TO PROVIDE AUXILIARY COOLING FACILITIES RATHER THAN ONCE-THROUGH SYSTEMS, PER MR. WARREN, IN RELATION TO PROJECTED TOTAL CAPITAL EXPENDITURES MAJOR ELECTRIC UTILITIES USING LAKE MICHIGAN WATER FOR COOLING

1970-1990

Required investment, 1971-1990, by electric utilities with generating capacity on or near Lake Michigan, per Mr. Warren, to provide auxiliary cooling facilities rather than once-through systems	
In projected 24,000 megawatts of capacity not now existing or under construction	$ 130,000,000
In conversion of all of the 15,000 megawatts of capacity now existing or under construction	150,000,000
Total required investment	$ 280,000,000
Projected capital expenditures, 1971-1990, by electric utilities using Lake Michigan water for cooling	
Total capital expenditures, 1971-1990, electric utility industry in United States	$ 485,000,000,000
Electric utilities using Lake Michigan water for cooling as percent of electric utility industry in United States	9%
Projected capital expenditures, 1971-1990, electric utilities using Lake Michigan water for cooling	$ 43,650,000,000
Required investment, 1971-1990, per Mr. Warren, to provide auxiliary cooling facilities rather than once-through systems in generating capacity on or near Lake Michigan, existing, under construction, and projected, as percent of estimated total capital expenditures, 1971-1990, of electric utilities using Lake Michigan water for cooling	$\frac{\$\ 280,000,000}{\$43,650,000,000} = .00641$ $= 6/10$ of 1%

several wells have been drilled in association with producing companies. One of these is producing commercial quantities of oil. In southern Louisiana, six wells have been drilled in association with independent producers. None of these was productive. More drilling is planned for 1971.

Meanwhile, Northern Michigan Exploration Company participated in a group headed by Sun Oil Company, which was successful bidder for 45,000 acres of underwater leases in the Gulf of Mexico, in a recent Government sale. Offshore exploratory drilling is to begin shortly off the Louisiana coast.

At present, it appears that it may be several years before new reserves of gas can be found, developed, and made available to customers. Thus, the shortage of natural gas in Michigan is real, and may continue for some time to come.

In the electric business, the most frustrating difficulty has been the Company's inability to operate its Palisades Nuclear Plant, 35 miles west of Kalamazoo.

This very important electric generating station, with a prospective output equal to nearly 20 percent of the Company's total generating capacity, has been ready for fuel loading and testing for some months. But it cannot be tested or begin generating power, until the Company is granted an operating license by the U.S. Atomic Energy Commission. This license has been held up by intervention of a few groups of environmentalists, who have succeeded in prolonging the licensing process by public hearings that have gone on intermittently since June 23, 1970.

These delays have been particularly exasperating because the plant was designed and built to conform with every applicable safety standard and regulation of the U.S. Atomic Energy Commission. Moreover, the plant complies with every air and water quality standard of the State of Michigan that is applicable to a facility at that site. The Michigan Public Service Commission has recommended that the plant be allowed to operate.

In effect, the Company and its more than one million electric customers have been caught in the middle of an argument between the environmentalists on the one hand—who fear radiological dangers and possible harm to Lake Michigan from heated water discharged by the plant—and the U.S. Atomic Energy Commission.

While absence of the Palisades plant has imposed a strain on the Company's electric service, fortunately it has been possible to date to meet winter peak demands of the Company's electric customers with supplementary power purchased from other utilities.

A critical period lies ahead. For the summer of 1971, the Company has arranged to purchase additional supplementary power to the extent that it is obtainable, but it is not available in sufficient quantities to provide the desired level of reserves for forced outages and planned maintenance of electric generating facilities. Recognizing the crucial importance of getting this plant on the line at the earliest possible date, the Company has endeavored for some time to have the environmentalists withdraw their opposition by offering to install the facilities they requested. These consist of cooling towers designed to substantially eliminate thermal discharges to Lake Michigan and additional equipment which is intended to result in an essentially zero release of radioactive materials in liquid discharges. Such facilities are in addition to those required by law and will cost an estimated $15,000,000. They are expected to result in an additional annual cost in excess of $3,000,000, attributable to reduced thermal efficiency of the plant, some curtailment of generating capability, and increased operating and maintenance expenses, as well as fixed charges on the invested capital. We are hopeful that such a settlement can be reached with the environmentalists in the near future and that the Palisades Plant may be generating power this summer and fully operational by September.

Meanwhile, intervention also is delaying the issuance of a construction permit for the Company's proposed nuclear plant near Midland. Some local residents and others, including certain of the objectors in the Palisades controversy, are seeking to prevent the granting of a construction permit for this plant. Hearings were held briefly in December, and are expected to resume in the second quarter of 1971. Preliminary work on the project now has been shut down, and work will not resume until a construction permit is granted.

On a happier note, construction goes forward on schedule at the site of the 1.8 million kilowatt Ludington Pumped Storage Hydroelectric Plant. This facility is being constructed jointly by Consumers Power Company and The Detroit Edison Company, and is due for initial pumping in late 1972, and for operation in 1973.

Despite the difficulties recited above, the management of the Company is confident that these obstacles will be overcome, with the continued support and efforts of its skilled and dedicated employees. Moreover, it is confident also that realistic rate relief will be forthcoming from the Michigan Public Service Commission in 1971, to give the Company a firm base on which to meet Michigan's expanding demands for energy in the years ahead.

Sincerely,

A H Aymond

A. H. Aymond
Chairman of the Board

James H Campbell

James H. Campbell
President

February 15, 1971

Statement of Income

FOR THE YEARS ENDED DECEMBER 31, 1970 AND 1969

Consumers Power Company

	YEAR ENDED DECEMBER 31	
	1970	1969
OPERATING REVENUE (Note 5):		
Electric	$334,904,154	$307,999,678
Gas	273,873,680	240,535,782
Steam	1,211,671	1,239,386
Total operating revenue	$609,989,505	$549,774,846
OPERATING EXPENSES AND TAXES:		
Operation—		
Purchased and interchanged power	$ 19,330,636	$ 13,530,397
Fuel consumed in electric generation	70,930,536	59,091,019
Cost of gas sold	117,874,862	106,868,113
Other	116,644,190	100,874,343
Total operation	$324,7[illegible],224	$280,383,872
Maintenance	32,817,757	26,121,267
Depreciation and amortization (Note 7)	55,600,057	51,880,650
General taxes	39,062,263	37,058,195
Federal income taxes	38,823,836	41,022,326
State income taxes	4,766,793	4,071,324
Provision for deferred income taxes, net	10,221,539	10,962,051
Charge equivalent to investment tax credit, net	448,537	3,416,145
Total operating expenses and taxes	$506,[illegible]	$[illegible]015,830
Net operating income	$103,[illegible]	$ [illegible]
OTHER INCOME:		
Interest charged to construction (Note 2)	14,108,197	8,421,485
Dividends from Michigan Gas Storage Company	1,650,000	1,350,000
Gain on reacquisition of long-term debt	1,074,465	768,802
Other	1,124,907	771,285
Gross income	$121,369,068	$106,170,588
INCOME DEDUCTIONS:		
Interest on long-term debt	$ 44,812,[illegible]	$ 35,956,150
Interest on notes payable	2,[illegible]	2,[illegible]912
Other	774,[illegible]	[illegible]183
Total income deductions	$ [illegible]	[illegible]
Net income	$ 72,[illegible]	$ [illegible]
DIVIDENDS ON PREFERRED STOCK	3,516,422	3,534,500
Net income after dividends on preferred stock	$ 69,315,187	$ 63,425,843
EARNINGS PER SHARE OF COMMON STOCK BASED ON AVERAGE SHARES OUTSTANDING (23,[illegible] shares in 1970 and 22,[illegible] shares in 1969)	$2.[illegible]	$2.79

The accompanying notes are an integral part of this statement.

Electric and Gas Operating Comparison 1970-1960

381

		1970	Per Cent Increase Or (Decrease) 1970 Compared with 1969	1960	1969	1968
electric revenue	**Residential**	**$133,131,799**	**11.6**	**74.7**	**$119,298,937**	**$109,988,430**
	Commercial	**87,727,018**	**15.1**	**117.5**	**76,246,495**	**69,952,596**
	Industrial	**102,501,526**	**4.5**	**96.2**	**98,132,472**	**91,018,176**
	Interdepartmental and Other	**6,101,767**	**14.7**	**108.2**	**5,320,222**	**4,849,742**
	Total Sales to Ultimate Consumers	**$329,462,110**	**10.2**	**88.8**	**$298,998,126**	**$275,808,944**
	Power Pool	—	—	—	—	**2,504,458**
	Other Resale	**6,661,084**	**19.6**	**125.3**	**5,567,956**	**4,912,924**
	Reserve for Possible Rate Refund	**(5,929,745)**	—	—	—	—
	Total Electric Sales Revenue	**$330,193,449**	**8.4**	**86.0**	**$304,566,082**	**$283,226,326**
	Miscellaneous Electric Revenue	**4,710,705**	**37.2**	**126.3**	**3,433,596**	**3,019,298**
	Total Electric Revenue	**$334,904,154**	**8.7**	**86.5**	**$307,999,678**	**$286,245,624**
electric sales (1,000 kilowatthours)	Residential	[illegible]	7.0	85.1	[illegible]	[illegible]
	Commercial	4,027,215	9.6	138.2	3,673,703	[illegible]
	Industrial	8,073,913	(5.9)	88.6	[illegible]	[illegible]
	Interdepartmental and Other	208,526	8.6	63.1	191,951	[illegible]
	Total Sales to Ultimate Consumers	18,241,484	1.4	96.1	[illegible]	[illegible]
	Power Pool	—	—	—	—	[illegible]
	Other Resale	565,183	15.6	126.4	489,051	[illegible]
	Total Electric Sales	[illegible]	1.8	96.9	[illegible]	[illegible]
peak load	**Kilowatts**	**3,448,345**	**2.1**	**83.8**	**3,377,275**	**3,179,715**
generating capacity	Kilowatts	[illegible]	4.4	56.8	[illegible]	[illegible]
heat rate	**Btu of Fuel per Net Kilowatthour Generated**	**10,120**	**1.8**	**2.7**	**9,941**	**9,804**
electric customers	End of Period	1,082,442	2.3	23.9	1,057,735	1,031,917
electric residential customer averages	**Annual Kilowatthours Used**	**6,222**	**4.5**	**49.5**	**5,954**	**5,609**
	Revenue per Kilowatthour Used	**2.24¢**	**4.2**	**(5.9)**	**2.15¢**	**2.16¢**
	Annual Revenue	**$139.64**	**9.0**	**41.1**	**$128.06**	**$121.18**
gas revenue	Residential					
	Using Gas for Home Heating	[illegible]	12.2	137.5	[illegible]	[illegible]
	Other	[illegible]	8.5	(40.2)	[illegible]	[illegible]
	Industrial and Commercial	[illegible]	13.0	221.2	[illegible]	[illegible]
	Interdepartmental and Other (1)	[illegible]	253.3	688.8	3,079,358	[illegible]
	Resale	[illegible]	(42.6)	(72.0)	796,401	[illegible]
	Reserve for Possible Rate Refund	[illegible]	—	—	—	—
	Total Gas Sales Revenue	[illegible]	14.0	172.7	[illegible]	[illegible]
	Miscellaneous Gas Revenue	[illegible]	5.9	110.8	[illegible]	[illegible]
	Total Gas Revenue	[illegible]	13.9	171.8	[illegible]	[illegible]
gas statistics (1,000 cubic feet)	**Gas Sales**					
	Residential					
	Using Gas for Home Heating	**134,435,759**	**4.2**	**150.1**	**129,060,276**	**120,256,312**
	Other	**3,733,980**	**(6.6)**	**(54.4)**	**3,997,083**	**4,215,239**
	Industrial and Commercial	**146,405,893**	**5.0**	**199.7**	**139,497,140**	**125,896,465**
	Interdepartmental and Other (1)	**24,805,995**	**243.8**	**568.7**	**7,214,920**	**482,506**
	Resale	**962,331**	**(51.7)**	**(74.6)**	**1,992,394**	**3,620,014**
	Total Gas Sales	**310,343,958**	**10.1**	**162.3**	**281,761,813**	**254,470,535**
	Net to Storage	**13,896,516**	**27.1**	**35.1**	**10,937,194**	**6,204,577**
	Unbilled, Lost and Company Use	**9,765,675**	**2.3**	**42.5**	**9,548,264**	**12,648,538**
	Total Gas Purchased and Produced	**334,006,149**	**10.5**	**146.6**	**302,247,271**	**273,323,651**
[illegible]	(1,000 Cubic Feet)	[illegible]	[illegible]	152.5	[illegible]	[illegible]
gas customers	End of Period	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Number End of Period	[illegible]	4.5	110.5	[illegible]	[illegible]
	Average Annual Mcf Used	[illegible]	[illegible]	6.0	[illegible]	[illegible]
	Average Revenue per Mcf Used	111.92¢	7.7	15.0	[illegible]	[illegible]
	Average Annual Revenue	$218.12	7.3	22.2	$203.27	[illegible]

(1) Includes intracompany sales of gas to the electric department for use in generating electricity in years 1970, 1969, 1968, 1965, 1962, 1961, and 1960.

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Impact of Additional Annual Cost in Excess of $3,000,000 to be Incurred by Consumers Power Company in its Electric Operations

Total electric revenues in 1970	$334,904,154
Increase in total electric revenue from 1969 -1970	$ 26,904,476
Application for increase in electric rates now before the Michigan Public Service Commission	$ 28,500,000
Increase in cost of purchased and interchanged power from 1969 to 1970	$ 5,800,239
Increase in cost of fuel consumed in electric generation from 1969 to 1970	$ 11,848,517
Increase in interest on debt from 1969 to 1970	$ 8,940,503
Estimated increase in monthly bill to average residential customer	about 10¢ or 8/10 of 1% increase

COST COMPARISON

ALTERNATE MEANS OF COOLING

Costs (In Excess of Once-Through)	Dry Mechanical Draft Cooling Towers					
	Interior Dept. Report[1,7]			C.E.Co. Studies[2]		
I. Capital Investment Costs	Dollars	$/KW	Mills/ KWHR	Dollars	$/KW	Mills/ KWHR
a. Pumps & Recovery turbines	1,360,000	1.36	.03	Included in c. below		
b. Basic Tower Units	10,200,000	10.20	.20	150,000,000	68.18	1.79
c. Footings	Included in b. above			3,300,000	1.50	.04
d. Controls	510,000	.51	.01	1,750,000	0.80	.02
e. Piping, Valves & Tanks	1,700,000	1.70	.03	29,200,000	13.27	.35
1) Backfitting Piping[6]	-	-	-	23,230,000	10.56	.28
f. Land Costs[4]	-	-	-	6,400,000	2.91	.08
g. Road & Track Work[5]	-	-	-	2,450,000	1.11	.03
h. Earthwork[3]	-	-	-	31,000,000	14.09	.37
i. Yard drainage, underground interference, & fence-work	-	-	-	790,000	.36	.01
j. Electrical	Included in a,b,d,&e above			49,201,000	22.36	.59
k. Contingencies	3,230,000	3.23	.06	7,125,000	3.24	.08
l. Top Charges	Included in k. above			38,056,000	17.30	.45
Subtotal	17,000,000	17.0	.33	342,502,000	155.68	4.09
II. Operating & Maintenance Costs[8]						
a. Loss of Capability	7,000,000	7.0	.14	90,043,000	40.93	1.07
b. Increased fuel costs	12,827,500	12.83	.25	22,294,000	10.13	0.27
c. Maintenance	Included in b. above			9,043,000	4.11	0.11
Subtotal	19,827,500	19.83	.39	121,380,000	55.17	1.44
III. Total Cost (Capital Inv. & Oper. & Maint.)	36,827,500	36.83	.72	463,882,000	210.85	5.54

Notes:

1. Estimates based on 1,000 mw - fossil unit
2. Estimates based on 2,200 mw - nuclear unit (Zion)
3. Earthwork includes items such as overburden removal, dewatering, excavation for circulating water piping & tower footings, and compacted fill for roads & towers
4. Land cost estimated at $10,000/acre
5. Road & track work includes relocation of existing roads, protection of circulating water piping at road crossings & alteration of track spur
6. Backfitting piping includes such items as modification to existing service water system, alteration of existing submerged circulating water intake piping, and new booster pumping stations
7. Cost breakdown reference - October 16, 1970, Letter-Bruce Tichenor, Pacific Northwest Laboratory to O. D. Butler, C.E.Co.
8. Costs are listed in equivalent investment dollars.

COST COMPARISON

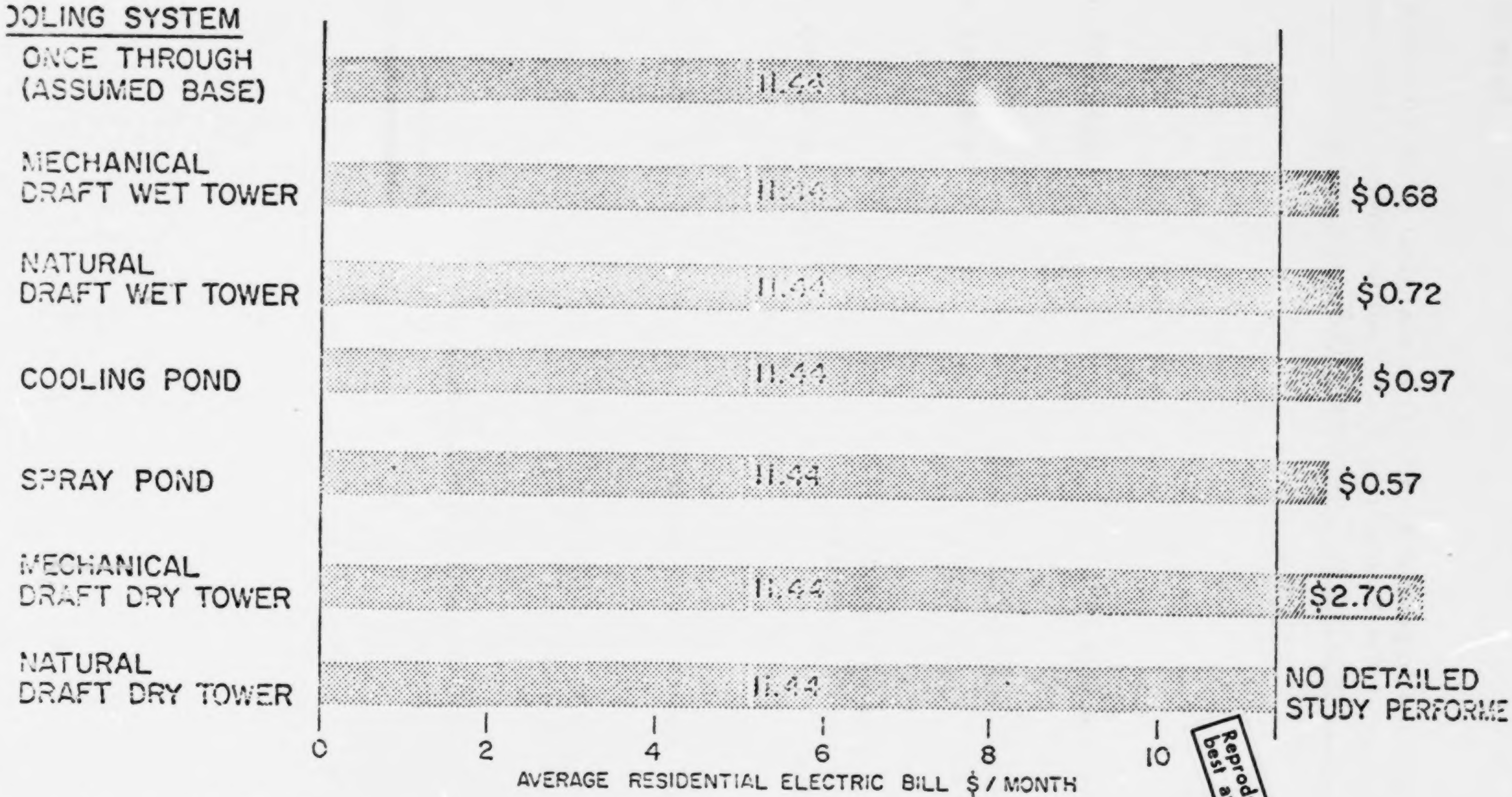
ALTERNATE MEANS OF COOLING

Costs (In Excess of Once-Through)	Wet Mechanical Draft Cooling Towers Case II					
	Interior Dept. Report[1]			C.E.Co. Studies[2,6]		
	Dollars	$/KW	Mills/KWHR	Dollars	$/KW	Mills/KWHR
I. Capital Investment Costs						
a. Condensers & Pumps	1,410,000	1.41	.027	Included in d. below		
b. Basic Tower Units	3,670,000	3.67	.072	16,000,000	7.27	.191
c. Footings	Included in b. above			Included in b. above		
d. Piping & Valves	Included in a. above			10,500,000	4.77	.125
1) Backfitting piping[3]	-	-	-	23,230,000	10.56	.277
e. Earthwork[4]	-	-	-	10,350,000	4.70	.124
f. Road & Trackwork[5]	-	-	-	290,000	0.13	.003
g. Yard drainage, underground interferences & fencing	-	-	-	205,000	0.09	.002
h. Electrical	Included in a.&b. above			1,855,000	0.84	.022
i. Contingencies	Included in a.&b. above			1,585,000	0.72	.019
j. Top-charges	Included in a.&b. above			8,000,000	3.64	.096
Subtotal	5,080,000	5.08	.099	72,015,000	32.73	.859
II. Operating & Maintenance Costs[7]						
a. Loss of Capability	-	-	-	37,142,000	16.9	.443
b. Increased fuel costs	462,000	0.46	.009	7,116,000	3.23	.085
c. Maintenance	Included in b. above			562,000	0.26	.007
Subtotal	462,000	0.46	.009	44,840,000	20.4	.535
III. Total Costs (Capital Inv. & Oper. & Maint.)	5,542,000	5.54	.108	116,855,000	53.12	1.394

Notes:

1. Based on a 1000 mw nuclear unit - 82% cap. fact. 33% eff.
2. Based on Zion 2200 mw nuclear 70% cap. factor 33% eff.
3. Backfitting piping includes such items as modification to existing service water system, changing of existing submerged circulating water intake piping, and new booster pumping stations
4. Earthwork includes such items as overburden removal, dewatering, excavation for circulating water piping and tower footings, and compacted fill for roadways and towers
5. Road & trackwork includes relocation of existing roads, protection of circulating water piping at road crossings and railroad spur alterations
6. C.E.Co. study is based on use of a hybrid round mechanical draft tower with 250' hyperbolic discharge stack for plume dispersal
7. Costs are listed in equivalent investment dollars.

COMMONWEALTH EDISON COMPANY
OVER-ALL EFFECT OF COOLING SYSTEM COST ON THE AVERAGE RESIDENTIAL CUSTOMER*
(ZION)



*1. Includes the direct increase to the residential customer on his monthly bill, ~~plus the increase~~ that commercial, industrial, railroads, etc. would incur and would in turn be passed on to the residential customer in increased costs of goods and services.

2. Average monthly residential bill for 12-month period ending [illegible] 1970 - $11.44.

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Evaluation of Impact of Additional Annual Cost of $18,930,510 from Installation of Wet Mechanical Draft Cooling Towers which would be Incurred by Commonwealth Edison Company

Total electric revenue in 1970	$886,992,000
Increase in total electric revenue from 1969 to 1970	$ 85,843,000
Request for increase in electric rates now before Illinois Commerce Commission	$ 95,000,000
Increase in cost of fuel consumed in electric generation from 1969 to 1970	$ 41,470,000
Increase in interest on debt and preferred stock dividends from 1969 to 1970	$ 26,818,000
Estimated increase in monthly bill to average residential customer	~~about 25¢~~ ~~[illegible]~~

bottom as by Moody's Investors Service, as to why these comparisons of the Federal Power Commission rather than revenues per kilowatt hour are proper measurements of cost of electric service to residential consumers.

If you look in the heading "Average bill" and let us say under 500 kilowatt hours, the figure way back in January 1940 shows $10.55; in 1950, $10.11; in 1960, $10.62; and on January 1, 1969, $10.32.

Now, in the last 2 years, there has been increase in these bills. But over the years, this of course is a most remarkable phenomena because this is in contrast to the rise in the consumer price index from 1940 to January 1971 of some 285 percent, and this record of virtually no price increase for electricity to residential consumers until the impact of the last year or two is a remarkable tribute to the managements of the public utility industry and the benefits of greatly improved technology and science.

Now, page two is a chart. The figures are somewhat out of date. They show percentage changes, 1964 to 1969, but they make a point that is still valid. The bar at the left is the electrical bill, and you can see what has happened to other service prices.

Now, to go on, I would like to make just a bit of a comment on the electric utilities that are involved here. The major electric utilities located along Lake Michigan — and I must say that some of these are my clients and anything I say is my opinion and not necessarily their opinion in any manner -- these major electric utilities located along Lake Michigan are among the largest and most successful business enterprises in the American economy, with high investment stature in the credit and capital markets. There is every reason to believe in the future, as has generally been the case in the past, strict but fair regulation by the State public utility commissions in the four States -- Illinois, Indiana, Michigan, and Wisconsin — represented at this Lake Michigan Enforcement Conference.

Fair rates of return which cover costs of debt and preferred stock and provide adequate earnings rates on common equity permit the electric utilities on or near Lake Michigan to attract large amounts of capital on a continuing basis. The added capital investment necessary to stop any damaging thermal discharge into Lake Michigan is simply insignificant when appraised in the framework of total construction expenditures and capital investment of these electric utilities on or near Lake Michigan.

In this connection, may I refer to page 3 of the exhibit material (See p. 371). Page 3 is simply a quick statement of size in terms of capitalization, total operating revenues, total electric operating revenues, at the end of 1970, or for the calendar year 1970, of these major privately owned electric utilities represented.

Page 4 (See p. 372) is a statement of the investment stature of these major electric utilities using Lake Michigan water for cooling.

I have shown at the left Moody's rating and Standard and Poor's rating of the senior debt. I have shown Standard and Poor's quality rating of their preferred stock and I have shown the Moody's quality rating and the Standard and Poor's earnings and dividend ranking on their common stock and the number of years in which dividend and common stock have been paid without interruption.

Commonwealth Edison, Consumers Power Company — top-notch, the highest rating in every category. The other companies not quite as high but almost, with high and very high investment stature.

Now, page 5 (See p. 373) refers to another matter. This is a measure of the overall earning capacity of these businesses. Page 5 shows the ratio of income available for capital to average total capital for the years 1963 to 1970. This is the ratio of interest for total debt, preferred stock dividends, and balance in net income for common equity to average total capital, including total debt, preferred stock, and total common equity.

You will notice the very remarkable record of earning power, pressures in recent years; rates of return in Illinois and Indiana are somewhat higher than for Michigan and Wisconsin, and they should be, because Illinois and Indiana are fair value jurisdictions.

The next page, page 6 (See p. 374) is earnings and common equity, rate of return on common equity, common equity ratio, and earnings per share, major electric utilities using Lake Michigan water for cooling.

On the top line for each company, I have shown the rate of return on common equity. Just below it is the common equity ratio which must be considered side by side with the rate of return on common equity, and then earnings per share. Over the years, the utilities have had remarkable growth in earnings per share. Yet by the same token we can see pressures emerging -- an occasion for rate increases, a flat behavior, for example, of earnings per share for Commonwealth Edison, 1967 to 1970, and a somewhat similar record for some of the other companies. These are top-notch business enterprises, large, highly successful.

Now, in terms of financing, expenditures, for alleviating the problem of thermal discharge, on page 7 (See p. 375) of my exhibit, I have quoted -- I have

C

shown -- copied out from the statement of Mr. Warren from the Federal Power Commission, which I believe was reaffirmed by the gentleman appearing yesterday for the Federal Power Commission -- in this Mr. Warren gave an estimate of estimated plant costs and required investments for converting existing capacity and that under construction and projected capacity not yet under construction to auxiliary cooling facilities rather than once-through systems, and the sum of the two figures that you see is $130 million plus $150 million or $280 million.

May I appraise that in terms of the size of these companies? Page 8 (See p. 376) shows construction expenditures in four of these enterprises, major electric utilities using Lake Michigan water for cooling. These are the actual construction expenditures year-by-year in the last 5 years and the 5-year total.

For Commonwealth Edison, in the 5 years ahead, the present plan is an additional $2.5 billion capital expenditures which will require Commonwealth Edison to attract an additional $2 billion outside capital; for Consumers Power Company, $2 billion estimated capital expenditures over the next 5 years, which billion and a half will have to be raised externally.

Now, there is a pattern to this. You see down below the ratio. Year-by-year these are running at about 9 percent — up above, a little below — on an average exactly 9 percent for these several years.

On page 9 (See p. 377), I have made there an estimate based upon the last survey of the "Electrical World," and recent estimates by the Federal Power Commission of total capital expenditures in the whole electric utility industry in the two decades ahead.

The Federal Power Commission, for example, for the decade 1971-1980 is estimating $180 billion, and the Chairman of the Federal Power Commission has estimated that in 1990, in present prices, not allowing for further inflation, total capital expenditures of the entire industry will be some $40 billion.

Now, on page 10 (See p. 378), I have started off with the required investments over the two decades per Mr. Warren. I then projected capital expenditures for the two decades for these major electric utilities using Lake Michigan water for cooling.

If for the two decades, total capital expenditures for the entire industry in the Nation should be $485 billion, and if the share of that continues the same for the electric utilities using Lake Michigan water for cooling as a percent of electrical utility industry in the Nation — 9 percent —

J. K. Langum

then in the two decades ahead, the projected capital expenditure, 1971 to 1990, of the electric utilities using Lake Michigan water for cooling would be some $43,650,000,000 and the ratio of the required investment over the two decades, $280 million, to the $43,650,000,000 is 0.6 of 1 percent.

My conclusion in my prepared statement on this matter is simply this: that the required investment necessary to install or build auxiliary cooling facilities as against once-through cooling with thermal discharge of heated water in electric utility plants now in existence, in plants under construction, in plants now planned, and plants projected to meet needs for electric energy over the next two decades would amount to about $280 million. This added capital investment necessary to prevent thermal pollution comes to about 0.6 of 1 percent of total capital expenditures, $43,650,000,000 estimated at current prices for the years 1971 through 1990 for these major electric utilities on Lake Michigan.

Now, Consumers Power Company and intervenors announced on March 16, 1971, a settlement of the dispute over the Palisades nuclear powerplant on Lake Michigan. I think that both the intervenors and Consumers Power Company merit the congratulations upon the agreement and the major step, in my opinion, toward the public good, and a tribute to both the intervenors and Consumers Power Company as a private enterprise.

The intervenors described the company program as a major advance toward protection of the environment through utilization of the latest and best technology. Consumers Power Company will proceed with a program to install and operate cooling towers designed to substantially eliminate thermal discharges into Lake Michigan and an essentially zero radioactive liquid release system at the Palisades plant. The company stated: "Such facilities are in addition to those required by law and will cost an estimated $15 million. They are expected to result in an additional annual cost in excess of $3 million, attributable to reduced thermal efficiency of the plant, some curtailment of generating capability, and increased operating and maintenance expenses, as well as fixed charges on the invested capital."

The additional revenues in excess of $3 million to cover this additional annual cost would be less than 1 percent of the company's total electric revenues in 1970. They would increase the monthly electric bill of the average residential customer, in my judgment, by 10 cents or less, a percentage increase of about 0.7 of 1 percent.

Now, if I might turn in the exhibit material to what is page 11, without a page number on it (See p. 379), it is headed "Consumers Power Company Annual Report 1970." This is a page from the annual report which contains the comment of the company about the possibility, at that time, of the agreement and the material which I just quoted. You will notice this is a plant with 710,000 kilowatts of generating capacity. The capital cost, $15 million for the added facilities, or some $21.13 per kilowatt.

Page 12 (See p. 380) shows the income statement of Consumers Power Company from their annual report, and which is the basis for my statement that the additional revenues needed to cover these additional costs — some $3 million — are less than 1 percent of the total electric revenues of the company.

And page 13 (See p. 381) is some detail about the electric business of Consumers Power Company including certain data which I shall now proceed to use in connection with the data on the previous page in analyzing this.

Page 14 (See p. 382) is an attempt to put this matter into context in terms of the company. The impact of the additional annual cost in excess of $3 million to be incurred by Consumers Power Company in its electric operation because of the agreement. Total electric revenues of the company in 1970 just about $335 million. The increase in total electric revenue from one year to another, 1969 to

1970, $26,904,476.

Consumers Power Company now has an application for an increase in electric rates before the Michigan Public Service Commission, $28,500,000 on an annual basis. Consumers Power Company is incurring additional costs all of the time. The increase in cost to purchase an interchange power one year to another, $5,800,000. The increase in cost of fuel consumed in electric generation of 1969 to 1970, $11,800,000. The increase and interest on debt from 1969 to 1970, $8,900,000.

Now, the $3 million additional cost and additional revenues is another cost. It presses on earnings but in terms of the framework of the company, you can see it is something which it will take in stride.

And at the bottom of the page, I estimate that the increase in the monthly bill to the average residential customer will be about 10 cents or about 0.7 -- not 0.8 -- 0.7 of 1 percent increase.

Now, then, in conclusion, if I may make some comments about Commonwealth Edison Company, estimates have been made by Commonwealth Edison Company as to the cost of cooling facilities at its Zion Units 1 and 2. The data on that are shown last in the exhibits. Page 15 (See p. 383) is a copy of what I understand to be the revised estimates of Consumers Power on dry mechanical draft cooling towers. But what is relevant here really is page 16 (See p. 384), as I understand it, on so-called wet mechanical draft cooling towers, and the estimates at the righthand side of the page by Commonwealth Edison Company on the bottom line.

The Commonwealth Edison's estimate in terms of total costs -- that is capital costs or investment costs, because apparently the operating and maintenance costs have been stated and listed in the equivalent invested dollars -- they show $116,855,000 of cost, of such capital investment and capitalized operating and maintenance cost, and $53.12 per kilowatt of capacity and 1.394 mills per kilowatt hour. Those figures, when translated out per Commonwealth Edison into the effect on the average residential customer are shown next on the exhibit.

This set of bar charts is the revised study, as I understand it, of Commonwealth Edison Company, which shows that for the mechanical draft wet tower there would be an increase of 68 cents per month on the average residential customer's bill, and that would be in relation to the $11.44 present average monthly bill.

Now, on page 18 (See p. 386), I have made an attempt, again, to put this into some context as I did for

Consumers Power Company. Here is an evaluation, as best I could, on the basis of the work paper material which was available to me, an evaluation of the impact of the additional annual cost of $18,930,510 from the installation of wet mechanical draft cooling towers which would be incurred by Commonwealth Edison if they were installed. The total electric revenue of the company in 1970, $886,992,000.

The $18 million annual cost -- the annual cost would be, of course, a slight percentage of that, slightly more than 2 percent. The increase in total electric revenue from 1969 to 1970, $85 million.

Commonwealth Edison now has a request for an increase in electric rates before the Illinois Commerce Commission of $95 million. Commonwealth Edison, like every other electric utility and every business, is in a hard race between sales and expenses. Here are a couple of increases in expenses involved. Cost of fuel consumed up $41 million last year. Increase and interest in debt and preferred stock dividends, 1969 to 1970, $26 million. Against that context, an additional cost of $18 million is an added cost of significance. On the other hand, it is the kind of cost that can be met and taken in stride by the company with proper regulatory action.

It is my estimate that using Commonwealth

Edison's figures, but translating them out in proper fashion, in my form, as I see it, that the estimated increase in the monthly bill to the average residential customer using Commonwealth Edison's total cost figures would be about 25 cents or less than a 2 percent increase.

I have two objections to the Commonwealth Edison's cost estimates. Sixty-eight cents per month increment instead of the 25 cents which I am here showing and which I think would be more accurate than 10 or 15 cents — the first objection I have is simply a suspicion, but if you refer to page 16 (See p. 384) of my exhibit material, the bottom line, the second from the right, Commonwealth Edison is using a figure of $53.12 capital investment in total per kilowatt of capacity.

Now, by comparison, the corresponding figure for Consumers Power Company and what they are going to do at Palisades is $21, and the figure apparently mentioned by the Federal Power Commission gentleman, Mr. Warren, somewhere above $10.

I am not an engineer and I am not in a position to testify as to the accuracy or lack of accuracy of the $53.12, but when I find this degree of difference without a satisfactory explanation to my opinion, that is, I am suspicious and I will drop it there.

Now, the second point of difference between me and Commonwealth Edison on this matter of cost is not a matter of suspicion. On this matter, I think they are wrong. Commonwealth Edison Company -- to go back to the bottom of page 3 (See p. 371) in my prepared statement, has estimated again that for mechanical draft cooling tower, Commonwealth Edison Company estimates a total capital cost including operating and maintenance costs listed in equivalent investment dollars at $116,855,000, with additional annual costs -- annual costs -- and necessary increases in electric revenues on this account of $18,930,510.

Now, by applying the entire burden of these added costs to residential customers -- in other words, at $18,930,000 -- that has all been applied in the 68 cent figure to simply the residential customers, which account for about 38 percent of the company's electric revenues. Commonwealth Edison estimated an increase of 68 cents per month to the average residential customer or about a 6 percent increase. For other cooling devices, percentage increases of 25 percent or more are estimated.

Now, I think this approach is fallacious in computation and I think it is incorrect as a matter of economics. Using Commonwealth Edison's total cost estimates, but applying them proportionately to 1970 electric sales to residential customers as compared with total electric sales and giving consideration to the larger energy production in the Commonwealth Edison system after the Zion units are in operation, the added cost per month to the average residential customer appears to be more like 25 cents or a percentage increase of less than 2 percent.

More than that, if instead of the $53.10 cost per kilowatt of capacity, due to the cooling towers which Commonwealth Edison has used, if we happen to use on that the figure for Consumers Power Company in the Palisades installation of cooling towers, namely $21, then this estimate of added cost to the customer — residential customer per month would not be 25 cents, it would be a little over 10 cents a month; somewhere between 10 and 15 cents or slightly more than 1 percent.

Now, Commonwealth Edison Company has been in and will be in rate cases and in such matters they are, of course — relate the expected increase in revenue percentage-wise not to residential revenues but, of course, to total revenues. The prospectus page 8 (See p. 376) from the January 7, 1971 prospectus of Commonwealth Edison notes, for example, the rate increases they received last year which would provide added revenues of about $36 million a year related to total electric revenues. If related to the average residential customer, it would be a wholly different thing. That rate increase of $36 million was 4.3 percent of total revenues of the company; if related only to residential revenues it would have been 11.36 percent. Now, we should also note by the way in that rate business, that the Illinois Commerce Commission, in addition to their finding of a fair rate of return on a fair value rate base and the increased revenue rate, made 50 percent of the authorized rate increase conditional and contingent upon the company's fulfilling a program of prescribed air and water quality measures described and listed specifically in the Commission's orders, and one of those points was "... Building a suitable intake and discharge system with suitable cooling facilities at Zion by October 31, 1971."

Now, Commonwealth Edison once again is going before the Commerce Commission for a rate increase of $95 million, and frankly they need a good big rate increase. They are describing that in their current annual report and in their literature to the public as an increase of about 10.4 percent, which it is. That is the way to look at these things. But if that were related to residential revenues, the increase would be about 28 percent, and I hesitate to say, and I will not say, what the combination of the rate increase last year or the 1,000 asked for would amount to if it were all related to the average monthly bill of the average residential customer.

That figure is shocking, and I will not give it because it would be misleading and a serious disservice to the company and its customers. But, by the same token, in my opinion, the revenue estimates and cost estimates on cooling towers at Zion presented by Commonwealth Edison Company not only to this Conference but to the Illinois Pollution Control Board, to their advisory group of scientists and the public, in my opinion, those figures likewise are in error.

Thank you.

MR. STEIN: Thank you very much, Dr. Langum.

Are there any comments or questions?

Mr. Dumelle.

MR. DUMELLE: Dr. Langum, in that bar chart that you included in your statement, near the end, the 68-cent bar chart --

DR. LANGUM: Yes, sir.

MR. DUMELLE: -- which is Edison's chart -- they have a footnote which says that these charges have been figured on the basis that you have been discussing, the increase in the residential customer, plus the increase that commercial industrial railroads, and so forth, would incur and would in turn be passed on to the residential customers in increased costs of goods and services.

Have you evaluated that portion of it, and do you have the company's method of computation of that? It seems to me that if that footnote is correct, that we are really not talking the same thing and they are presenting it on one basis and you are presenting it on another and I would be interested in your comments.

DR. LANGUM: Yes, I have attempted to evaluate that in terms of the economics of it overall it is wrong, and in terms of the practical looking at revenues, it is wrong. The residential customer pays his revenues, and the railroads and the industries and the commercial enterprises pay their costs, and to the extent that they can pass them on, that is their business, and their problem. But it is not a matter inherently in the residential bill of Commonwealth Edison or any other electric utility.

Now, specifically the way that 68 cents is computed is precisely, as I understand it, what I have criticized. The Commonwealth Edison shows a total cost for the installation of the cooling towers of $116,855,000. Now, that is total capital cost. We have to take a figure times that -- 16.2 percent, I believe we have used -- and I have no quarrel with that figure for fixed charges and taxes, depreciation -- that would give $18,930,510 as the estimated annual cost from the installation of the proposed cooling towers. That $18,930,510 I use in different comparisons, as you will recall.

Now, then, if that figure of $18,930,510 added cost per year is divided by 3,307,685, the number of residential customers of Commonwealth Edison, we get $8.20 per year added cost, and then if we divide $8.20 by 12, we get exactly 68 cents per month, and specifically that is relating all of the additional annual cost to the residential customers of Commonwealth Edison Company, and then comparing that with the $11.44 average monthly bill in the 12 months ending June 30, 1970.

MR. DUMELLE: I would just hope that Edison, if they do speak, would discuss this point.

MR. STEIN: Yes.

MR. MILLER: Mr. Chairman, I have a point of clarification of Dr. Langum. In a number of these tables you have major electric utilities using Lake Michigan water for cooling, and in these you show American Electric Power in Indiana -- now, we have a number of American Electric Power Company plants in Indiana, but to my knowledge none of them are using Lake Michigan water for cooling.

Could you tell me where this plant would be?

DR. LANGUM: Yes. I have shown American Electric Power Company in my financial comparison because it is the parent holding company of Indiana and Michigan Electric Company.

However, on the specific matters relating to, say, an appraisal of capital expenditures, for example, on page 8 (See p. 376), I have shown only the figures, of course, and only those are relevant, namely for Indiana and Michigan Electric Company.

MR. MILLER: Indiana and Michigan Electric Company has no plants in Indiana using Lake Michigan water for cooling.

DR. LANGUM: Well, it was my understanding -- I do not have the details here -- that the American Electric Power Company definitely has a proposed -- has a plant under construction along Lake Michigan which would use the lake for cooling.

MR. MILLER: This is correct, but it is not in Indiana.

DR. LANGUM: Not in Indiana. Well, my analysis of this, you know, on page 8 (See p. 376), and how I used it on page 10 (See p. 378), was not directly relevant to the State of Indiana, but rather to these electric utilities as a whole, you see, and comparing for these same electric utilities, the estimates may require additional investments on the common auxiliary cooling facilities and, of course, in terms of that comparison, it makes no difference whether they are in one State or the other.

MR. MILLER: I would agree with this, but it does make a difference in the table in inferring that the plants are in Indiana, and there are no such plants in Indiana.

DR. LANGUM: Well, I recognize that, and I have not, I don't believe — I have not intended to give the impression, if I had, it is wrong, of a plant located in Indiana. The company is in two jurisdictions, and ordinarily I have considered it under Indiana because of the predominance of the fair value type of rate base in Indiana in determining its earniangs.

MR. STEIN: Are there any other questions?

MR. PURDY: Yes.

Dr. Langum, after your excellent financial review and your expertise in this area, I am tempted to sneak in a couple of questions of whether or not I should invest in a public utility and, if so, which one, but that isn't my question.

MR. STEIN: I was thinking of that. You know, while he was talking, I was regretting that rule we have in the Federal Government that regulatory officials can't buy stock in the company.

MR. PURDY: But on your financial review, again, I have no doubt of who is going to pay this bill, and I am not saying that the cost here should influence the action of, say, Michigan, in what sort of action they should take. Because on an industrial plant, if waste treatment is needed why you order it to be done, and the cost is passed on to the consumer, to the individual. If a municipality needs treatment you order it to be done and it is passed on to the consumer or to the residents of that municipality, and here if something needs to be done, why I am sure that is going to be passed on to the customer. So my question does not influence the action we should take, but only so that the customer doesn't get surprised. And in your analysis with respect to Consumers Power and the additional cost per customer on the system, this relates only now to the additional cost to the customer on that system for installing cooling facilities at the Palisades plant, and that as we look at other plants on the Consumer system, either in Lake Michigan or on the other Great Lakes — because very probably this decision on Lake Michigan will set a pattern for the other Great Lakes and they are not that much different — that the total cost of backfitting to the Consumer customer can be considerably more than what you have reported in this paper.

DR. LANGUM: Yes, that is true. You are quite right, of course, that the only place these additional costs can come is from the revenues paid to the public utility by the consumer, because the utilities have no funds, and the money to cover costs must come from the revenues. And if you refer to page 14 (See p. 382), I stated expressly, of course, that I was appraising the impact of that $3 million figure, and that only. And I recognize that Consumers Power Company has other situations where additional costs may be incurred on account of cooling facilities or other environmental requirements, and in turn this has to be put in the framework, as I endeavor to do by giving two or three examples, of increases in other costs. Consumers Power Company, Commonwealth Edison Company -- every electric utility, every business, is in a hard, desperate race between sales and expenses, between sales and invested capital. This is one additional expense, I think, that is so small in relation to residential customers and in relation to the overall affairs of the company, that we should take no chances with any possible thermal discharge. But I recognize it is added cost, and I have tried to make certain appraisals of it.

MR. PURDY: Yes, I think you have pointed it out very clearly in your paper, but frequently others pick up figures and quote them possibly out of context, and this only represents the additional cost for Palisades.

DR. LANGUM: That is right.

MR. PURDY: And, as you apply this to the rest of their plants on their system on the Great Lakes, that this adds to it.

DR. LANGUM: That is correct. This is taking only that one isolated action, the installation of the cooling tower at Palisades.

MR. STEIN: Are there any further comments or questions?

If not, I have one last general one, and I want to get back to the total impact of your statement. I would like to bring you back -- and this is for a point of clarification -- to page 2 of your general statement, where you take Mr. Warren's figures, and you say that it is "... estimated that the required investment necessary to install auxiliary cooling facilities as against once-through cooling with thermal discharge of heated water, in"-- and here is the key point -- "electric utility plants now existing, in plants under construction, in plants now planned, and plants projected to meet needs for electric energy over the next two decades, would amount to about $280 million."

Then you take this and you say this will increase after awhile the average monthly bill of the residential customer by 10 cents a month. Is this correct?

DR. LANGUM: No, that isn't quite right, sir. The comparison on page 2 is for the group which I have studied of the major electric utilities on or near Lake Michigan, and I have related an estimate on required investment and capital expenditure for the cooling towers and the like to the total capital expenditures of these same companies.

I have not measured; I am not able to measure the import of that for the additional cost to all of the utilities. I have made a specific study of that 10 cents or more per month per residential customer only for Consumers Power Company and for Commonwealth Edison.

MR. STEIN: All right. Now, we have heard your figures on Consumers Power, and I think this is -- and Consumers Power you figure it is going to be 10 cents or less, right?

DR. LANGUM: Yes, sir.

MR. STEIN: For Commonwealth Edison, you finally came down with a figure -- they came up with a figure of what, 68 cents?

DR. LANGUM: Yes, sir.

MR. STEIN: And then you used their computation, and you came down to a figure of about 25 cents, but you said if your suspicions were right that it might be 10 cents.

DR. LANGUM: Yes. I would like to amend that last, as I did, 10 to 15 cents.

MR. STEIN: Ten to 15 cents.

DR. LANGUM: Yes. The reason for that is simply this: that the cost per kilowatt for the auxiliary cooling facilities at Palisades is $21. The estimate for the same thing by Commonwealth Edison is $53. Twenty-one is about 40 percent, you see, of that, and if we apply that to the 25 cent figure, we would get 10 cents.

However, somewhat more than that is involved because this covers only the added capital investment, and there are certain operating and maintenance costs, and there is some loss of capability and need for additional capacity elsewhere. That is why I put that -- if you just consider alone $21 cost per kilowatt instead of $53, it comes out 10 cents, but there are certain other matters, that is why I say 10 to 15 cents.

MR. STEIN: Well, let's suppose we extend it to 15 cents. I appreciate your public interest in coming forward like this and giving us this information because this is very helpful indeed. Let me go back to page 2. What I would like to know is how typical these analyses of the Palisades and Commonwealth Edison you might figure, if you can, are to the kinds of increases we might expect in plants now planned. Would these figures of about from 10 to 15 cents, you think, apply -- let's make the assumption -- within the present day prices?

DR. LANGUM: We would have to make that because these figures will certainly go up over the years.

MR. STEIN: Yes. But would you assume that this is pretty typical of the plants now planned -- of these two plants you analyzed?

DR. LANGUM: Yes, I think the figure for Consumers Power Company is a very accurate figure.

MR. STEIN: I understand. But how would that apply, say, to other plants, in your opinion, which you haven't analyzed? Is this a typical one?

DR. LANGUM: I have not -- I have simply not studied other similar matters for other plants. So I can't say that it is typical generally. However, Commonwealth Edison and Consumers Power Company are very, very large companies and just those two companies would bulk very large, as you know from the figures, in the totality of the electric utilities around Lake Michigan.

MR. STEIN: I understand your reluctance, sir, and I am not going to keep pushing it, but we have — if we are dealing with a pattern here I think we should know this.

You have analyzed two plants, and it seems to me you have come out pretty close -- one a dime or less, and the other between 10 and 15 cents.

Now, we also have a large group of plants in there, where some plants may be backfitting; some plants may be under construction; some plants are planned.

The question is: What is this going to mean to the utility bill for that vast spectrum of plants near the lake. Is your analysis fairly typical and can it be applied to those plants, or does it just relate to these two plants and no more?

DR. LANGUM: Well, my analysis relates to these two plants and companies and no more. However, I think it would be a useful starting point -- let's put it that way — in appraising the situation elsewhere.

You understand, of course, that this would vary from company to company obviously on the terms of the particular engineering matters involved, and the location, also the distribution of residential revenues to total revenues. You see that would have an effect on it as well.

I think this whole area, a very thorough study in checking out of costs is extremely important, and I think — and we must have much more work done on it so that you gentlemen and other similar authorities can make the proper decision.

MR. STEIN: But it is your view now — and let me ask this one last question — that we have really done a case-by-case analysis on two plants. You would suggest before we use that case-by-case analysis that you made for these two plants to be applicable to other situations in Lake Michigan, that we adopt a cautious technique of using a case-by-case analysis on every plant rather than projecting it as a general rule.

DR. LANGUM: No, I don't think that would be my conclusion. I think that these two cases are large enough and clearcut enough to offer, as I say, a starting point and guidelines, and I would certainly in any other case require all of the figures necessary for a thorough study of the cost. But I think this is a starting point.

In other words, I am saying perhaps maybe this is typical of this general order of things, but I wouldn't want to be tied down in any sense to 10 cents versus 15 or 16 or something like that.

MR. STEIN: Dr. Langum, here is where I come up with this difficulty. Let's go to the first sentence of your statement. It says: "Economic considerations should be no bar to effective actions by the appropriate regulatory authorities which substantially eliminate thermal discharge of heated water into Lake Michigan by electric generating plants." This is a general statement.

I understand what you are saying very well. I think you have had a very professional and precise analysis and I followed it. I thought it was very well done, very well presented. But here is the question: What we get is we boil down that you come to an analysis of two plants, and then we have to take your generalized statement in the first sentence, and I have asked you if we could use those two analyses to project it to support this.

I think we have to get — I am trying to get the feel for the conferees of what you are trying to say. Please understand, I am trying to get this in the sense of a clarifying sense. I have no position on this. I just want to understand what you have been saying.

DR. LANGUM: The conclusion — the first sentence, of course, rests upon several matters. It rests upon my analysis of the capital expenditures, and it rests upon the past price behavior of our electricity. It rests upon a judgment which is implicit here of how important the additional investment, and the additional cost of the cooling towers or other facilities are in terms of the company's overall operation. And I think in terms, again, of the particular bearing of the increase in cost to residential customers, that there is -- that while the specific studies for Commonwealth Edison and Consumers Power Company are specific studies and not to be just taken as typical, they are for important enough companies and important enough situations to thoroughly justify that generalization in terms of the overall pricing of electricity.

MR. STEIN: Thank you.

Mr. Purdy.

MR. PURDY: Yes. Mr. Stein, again, now, so that I don't misunderstand the analysis, in attempting to project this, when you say 10 cents per customer on the Consumers system, you are talking about spreading this cost of the Palisades plant to all of the customers now on the Consumers system. Is this correct?

DR. LANGUM: That is correct. And the 10 cents is how the share of how the residential revenue share of total revenues and share of the added $3 million cost -- what that would mean to the residential customer.

MR. PURDY: So let's say you had another twin plant of the Palisades already existing on the Consumers system, and you went ahead to backfit that also, now it is not a 10 cent per customer, you have to add that as cumulative cost to the customer, and it now becomes 20 cents per customer.

DR. LANGUM: Yes, that is correct, if it were something just like Palisades. And it would be 20 cents per average residential customer, too.

MR. PURDY: Right.

DR. LANGUM: In other words, I have computed that 10 cents by taking a proportionate share, you see, of the $3 million, precisely as the total revenues are now divided.

MR. PURDY: So that as you build new capacity on the system, that new capacity that is built to serve new customers may be at some rate, but that new capacity that is built to serve the existing customers and their increased utilization of power makes further addition to their bill, so it isn't going to be something that you can project and say it is 10 or 15 cents per residential customer.

DR. LANGUM: No, I would certainly hesitate to project that and in part because of the extremely important influence of continuing major inflation on construction costs.

MR. PURDY: Okay.

MR. STEIN: All right. Are there any other comments or questions?

If not, thank you very much. This has been a very, very useful contribution indeed, Dr. Langum.

DR. LANGUM: Thank you.

MR. STEIN: We will recess for lunch and return here at a quarter to 2:00.

(Noon recess.)

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AFTERNOON SESSION

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MR. STEIN: Let's reconvene.

In the absence of any indications to the contrary, I would suggest that the States run their way through the citizen participants and nongovernmental and nonindustrial groups to give them an opportunity to make their statements first on thermal, of course, and then we will go to the others, but we will give you an opportunity before we call on industry or any other participant groups.

How many others did you have on your list of thermal participants?

MR. BLASER: Illinois has really two more.

MR. STEIN: Two more?

MR. BLASER: Yes.

MR. STEIN: Wisconsin has two.

Let's take your two, as we agreed, and then we will go to Wisconsin, and then we will follow the rotation of the States for people who wish to make statements about other aspects of the problems.

Would you call your two, Mr. Blaser?

MR. BLASER: All right. Mr. Bernard Scharr. Is he present?

MR. STEIN: Pardon me. Before we start this, is Mr. Conti in the room?

MR. CONTI: Yes, sir.

MR. STEIN: The Atomic Energy Commission wishes to make an additional statement. As you know, I did make a statement for them this morning in accordance with the instructions from that Commission, but I think since Mr. Conti has asked for this, and they want to clarify the record, it would be best if AEC spoke for itself. So before we start with that, let's call on Mr. Conti.

STATEMENT OF ENRICO F. CONTI, ASSISTANT TO THE MANAGER FOR ENVIRONMENTAL ACTIVITIES, ATOMIC ENERGY COMMISSION, CHICAGO, ILLINOIS

MR. CONTI: Thank you, Mr. Stein.

In response to yesterday's question asking whether presently proposed plants on Lake Michigan can be built while in-depth studies are being conducted, I gave an affirmative response.

Since it is possible that this answer could be misinterpreted, I would like to amplify it.

The statement I presented yesterday reflected AEC comments on the Conference Technical Committee on Thermal

Discharges to Lake Michigan recommendations and was not intended to make a judgment with regard to any particular powerplant.

Our basic position is that cooling towers are not necessarily required for every powerplant to be built on Lake Michigan.

As indicated in the statement I read yesterday, both cooling towers and once-through cooling systems need careful examination for each individual situation. We feel, therefore, that each plant should be considered on its own merits in regard to thermal effects.

Thank you.

MR. STEIN: Thank you, Mr. Conti.

Any comments or questions?

If not, thank you very much for your statement.

Mr. Blaser, may we go on?

MR. BLASER: All right. Is Mr. Schaar here today?

Michael Bialas. Mr. Bialas I know is here.

STATEMENT OF MICHAEL E. BIALAS, CHAIRMAN, COMMITTEE ON ENVIRONMENT, CHICAGO AREA COUNCIL OF LIBERAL CHURCHES, CHICAGO, ILLINOIS

MR. BIALAS: I am Mike Bialas. I am the Chairman of the Committee on Environment for the Chicago Area Council of Liberal Churches, and I come as leader of that group as well as a private citizen.

I have prepared a statement here. I only have a few extra copies here, and a few extra comments afterwards.

A question from the American Museum of Natural History which I got in the mail with an advertisement says: "What's filling Lake Michigan faster than waste?" And the answer that they gave was algae.

And the University of Michigan researchers, sponsored by Federal Government have found species associated with pollution in all parts of the lake and predict massive algal blooms within 2 years, which will make our water unfit to drink in the Chicago area. Before the death of Lake Erie, a superabundant algal bloom appeared and shortly thereafter the mayfly and mudpuppy disappeared signaling the complete breakdown of the food chain process.

M. E. Bialas

To go into the contradictory statements of the Technical Committee report and all the fine points of the issue would be to continue to fiddle while Rome burns. We have been trying to solve this problem for over a year now and we seem to be nowhere near beginning to solve our dilemma. I hear all kinds of time periods and dates bantered about here today, such as "by 1976," "in 32 months or 42 months while they are installing cooling towers." But we only have 2 years left for our vital Lake Michigan. We don't have time to continue haggling over the rules of the game when we are so close to the end. What does it require to make our leadership in government and business see their responsibility? All our activities, even to educating our young, are worthless if we leave a lifeless heritage.

In every area and in every way, we continue to procrastinate regarding what and how to do it. Everybody says it takes time and money. Well, it is taking me time and money to be here and everywhere else to fight for our survival. It is taking time and money to fight in Viet Nam, to build an SST, to go to the moon, but we do not have time here and nobody wants to spend the necessary moneys. While discussing our current local school crowding problem, someone remarked to me that the lack of timely action in that issue is the price of our democratic procedure. I feel this could be applied to pollution problems, in that we have used that argument in this survival issue to rationalize inaction, and in waiting to exhaust all avenues of remedy short of the final desperate act of injunctive procedure.

We must, now, declare a moratorium on discharge of all pollutants or suspected pollutants -- heated water, chemicals, oils, pesticides, fertilizers, municipal waste products, everything. Short of that, we must examine each polluting source and immediately force an early end by determining what must be done and how to do it. We must issue an ultimatum to the polluters: Stop or shut down. Powerplants and industries discharging heated water and chemicals must be shut down until alternate solutions are available.

Pesticides must be completely discontinued and new pest control methods used. In the past week, I heard from a news reporter that Mr. Ruckelshaus has delayed the ban on DDT and other pesticides for another year pending further study. How many more studies will it take to kill a lake?

Fertilizers for agriculture will have to be rigidly controlled and farmers will have to move their animal pens, if necessary, to avoid the runoff of manure into Lake Michigan's related streams.

Municipalities will have to make immediate changes in their disposal systems to divert sewage from Lake Michigan. If financial, technical and other help is required by the polluters, this must be made available on an emergency basis, so that they can join the ranks of the non-polluters.

All oil spills must be avoided by not allowing potential sources to operate. All marine vessels must be checked before they are allowed into the lake; this includes ocean vessles. Size of oil tankers must be greatly decreased; the current monsters have certainly proved themselves unseaworthy.

Above all, with this emergency situation, we must have Federal control and leadership in all areas, with Environmental Protection Agency supervising all operations until the four states can separately provide their necessary protective moves.

In further remarks, I want to comment that my group signed a petition that was issued by the Committee on Lake Michigan Pollution Control. It is the Committee on Lake Michigan Pollution, I mean.

As far as other things that have been said, I kind of am wary even of regulatory agencies -- people who are supposed to protect our environment. I know in a current issue of Sports Illustrated, they have an article called "The Poisoning of the West," in which the National Wildlife Service is being implicated. So it means that citizens must be always on the alert for -- individuals in all areas -- of this problem.

A couple of other things came to my mind -- the fact of the need for electricity, but what I think is we will have to reduce our demands. We will have to stop advertising affluence in this country. As far as cost of nuclear powerplants, I felt also that one cost that wasn't mentioned -- I don't know all of the answers on it -- but I think, as I recall, radioactivity material is accumulated. Somebody has to get rid of it. Somebody has to pay for the movement of this, and also the storage, and I think the Federal Government is being stuck with that bill, for we are getting it in our taxes eventually.

Thank you.

MR. STEIN: Thank you, Mr. Bialas.

Any questions or comments?

Let me ask you: I am not sure I understood you. You talked about polluters, and you said "Stop or shut down."

MR. BIALAS: Both.

MR. STEIN: I understand.

MR. BIALAS: Yes.

MR. STEIN: You said,"stop or shut down."

Now, do I understand your point of view if we find that a powerplant is polluting we tell them to stop now or shut off the electricity?

MR. BIALAS: That is what I am saying. There is no point, when you have 2 years, and you are talking about 32 and all this --

MR. STEIN: Now, let me push another point. You know we have water supplies in the various cities and these fellows use a sand filter, and the sand filters get filled in their backwash and then they put this backwash into the water and people think that is a pollutant. Now, if we find that that is a pollutant, do you recommend that we shut the water supply down as well as the electric supply?

MR. BIALAS: I would think in the case of water supplies that would require immediate correction of all because --

MR. STEIN: Well, supposing they can't correct them immediately?

MR. BIALAS: This is one place where I guess we would have to backoff on immediate stopage because you have to have drinking water.

MR. STEIN: Right. We can't do without water, but we can do without electricity.

MR. BIALAS: Yes, to the extent that we want to in this country right now.

MR. STEIN: Consider the poor unfortunate soul like me, who lives in Fairfax, Virginia, and has a well, and I don't have electricity, I can't pump water from the well. How am I going to get water if you turn off the electricity?

MR. BIALAS: It is a matter of priority. That is the important thing on this issue.

MR. PURDY: Mr. Stein, if we would follow that same line of thinking, with respect to municipalities and where there is a pollution problem in a municipality, and so now you shut off the sewage treatment plants, you don't need any water anyhow. (Laughter)

MR. STEIN: I guess that is right. I want to do that anyway. I am trying to convince my wife to have that green concrete.

Any other comments or questions?

Thank you very much, sir.

MR. BIALAS: Thank you.

MR. BLASER: That concludes the list for Illinois.

MR. STEIN: Well, we have some from Wisconsin.

Mrs. M. G. Dahl

MR. FRANGOS: Mr. Chairman, I would like to call Mrs. Miriam G. Dahl, who is the State Division Chairman of the Water Committee of the Isaac Walton League.

Mrs. Dahl.

STATEMENT OF MRS. MIRIAM G. DAHL, STATE DIVISION CHAIRMAN, WATER COMMITTEE, IZAAK WALTON LEAGUE, MILWAUKEE, WISCONSIN

MRS. DAHL: May I offer a suggestion to Mr. Stein before I begin this talk? You mentioned that you would be hard put to it to get water our of your well. We used to do it this way (indicating). (Laughter)

MR. STEIN: Yes, so did I. But you know I have been spoiled by electricity; I would be hard put.

MRS. DAHL: Conferees, I wanted to thank you for allowing me time to be heard. I am Miriam G. Dahl of Milwaukee, Wisconsin -- Mrs. for those who are interested.

I am an interested citizen directing my efforts for good conservation through many organizations, but presently mainly through the Izaak Walton League of America where I serve as Air Quality Representative for a local chapter, also as Chairman of the Water Committee for the Wisconsin State Division, and as a Member of the National Water Committee, and a National Director of Izaak Walton League.

I have been given permission, in addition to speaking for the State Division and for myself as a citizen,

Mrs. M. G. Dahl

for the National Izaak Walton League today.

For six years, I chaired the Wisconsin State Division of Pollution Abatement where I was actively engaged in all phases of conservation, including the KAB -- Keeping America Beautiful -- and the Anti Litter.

I have become aware of and active in every area of work resulting in a realization for me of the ecological interrelationships and the global scope of our local actions.

In the careful analyses capably prepared and presented here today, it is evident that progress to good discussions is being made. The Wisconsin Division of Izaak Walton League of America has presented a comprehensive statement to this group previously.* We stand on the points made then, and ask that those statements be incorporated into the present record.

We do this in the interest of conservation by saving time for everyone, and the paper necessary to reproduce another statement. We believe that the little things do count.

At this time, we commend your decision to limit heat additions to 3 degrees. We hope that this is a 3° effluent discharge not a 3° hearing permit.

However, the Izaak Walton League will hold to its opinion that a 1° discharge increase is generous enough and really not necessary at all -- even the 1° — if we use our ingenious expertise to find new methods.

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*pp 2050 - 2054 Act 1970 Workshop Sessions

We request addition of the following to the original statements which we have asked to be incorporated today. While giving full attention to the analysis of the present situation and methods, we ought to look at new developments which I have not heard mentioned anywhere. The closed circuit method is very good, but cooling towers are expensive monstrosities, cluttering, if not defacing, any landscape, and using precious earth footage. We are talking about starvation in the near future. We are talking about over population. In another breath we are talking about building this sort of a monstrous business only to cool water. It doesn't make very much sense from a conservation point of view.

Alternate methods of cooling can be developed. We believe this. We may need a new approach. Perhaps we even need a new map, but presently refrigeration can accomplish most of the cooling, so I am told by engineers, and the finishing of the cooling could be done with a pond or smaller cooling troughs. A pond could serve as a recreational area or an experimental area which we do need, and this would provide multiple use.

Energy from the cooling also ought to be redirected to useful purposes. Not allow it to be thrown off as waste. We are doing too much of that, and not enough recycling of our resources. New methods of producing nuclear power using lighter elements -- and I am sure you gentlemen have heard of this recently -- instead of the heavy elements would eliminate entirely, I am told, the reactive wastes, and this in itself would create disposition of a very large problem with which we now are concerned. This method could produce energy enough from one gallon of sea water equivalent to using 300 gallons of fuel oil, and if you will divide the use per annum of our fuel oils and our gases presently available, you will see that we have some concern within the next 20 years over what we will use for fuel. We should be thinking of those things as well in the whole context.

It may be well that the answers are here now eliminating many of those problems with which we are wrestling today. Let us be aware of these developments, and rapidly include them into economic use. And I stress that again: Rapidly include them -- the new development -- into our economic use.

Let us build our new economic structures with the idea of adaptability as these new methods develop.

And I thank you very much, gentlemen, for your time and your attention.

MR. STEIN: Thank you, Mrs. Dahl.

Are there any comments or questions?

Mrs. Dahl, let me take a minute with you because I really do think -- and I say this in the broadest possible sense -- that we really need an understanding between the public groups and the official groups.

I think it was very, very clear here about the 3° rise. The proposal made by the Federal conferee was that all new plants and plants under construction should go to closed cycle, which may cut that down. But that the 3° rise, as I listened to it, was not an effluent requirement but 3° within a mixing zone of 1,000 feet. I think we should understand what they are saying are two quite different things.

MRS. DAHL: Yes, indeed. Indeed.

MR. STEIN: There is one other point. I think you should keep talking about ponds and new devices. I push this all of the time myself. We get a supplement to our Sunday paper that has a feature which always has new products. They are always talking about these great new products in glowing terms and what they are going to do. I rarely see them; they don't last.

Mrs. M. G. Dahl

Mrs. Dahl, my experience with two major powerplants I recall outside this area and major engineering firms handling those powerplants which deal with ponds for cooling don't come up nearly with the kinds of reductions we are talking about here. They need a lot of space. You would be surprised how much space. In fact, the cooling we are getting in those proposed ponds, which may or may not go forward or lakes which may or may not go forward, doesn't quite do this.

Now, I know, and I share your concern about cooling towers and the lack of aesthetics that one of these towers might create. But I hope we are going to look at the hard facts. The trouble is that when all is said and done, these engineering plans come in, and I have to look at the hard facts done by top engineering firms and reviewed by our people, and when our people say there is nothing wrong with the engineering, I am sort of dismayed at the kind of heat reduction they get with the ponds or how much water you will need in the pond for the nuclear plant in order to get some kind of heat reduction.

Now, I appreciate the glowing terms in which new processes are always described, but I ask you to reconsider. As I have seen it here right today, the citizen groups have been infinitely more sophisticated here, and they are getting infinitely more sophisticated in every conference or hearing I have. But I suggest that you stay with us with the new processes; look at them with a healthy skepticism and see what they can produce, not what they claim.

MRS. DAHL: Thank you very much. And if I may say so, I did compliment you with all earnestness over what you are doing. May I also add that this kind of experimentation has built our country. I am looking at it from the point of view that was shared by one you all know and I am sure you love and esteem, who said, "I have done several experiments" -- I won't say how many, 60 or 70, and was told that he ought to quit because he has found out nothing works. And the evidence is piling up, and he said, "I can't quit now. I haven't found that nothing works. I have only found that these 70 do not work and that I shall try until I find one which does." And I think you all know that I am talking about Thomas A. Edison, without whom we would not be as well lit. (Laughter)

MR. STEIN: Or as well heated.

MRS. DAHL: Or as well heated.

I thank you.

MR. STEIN: Thank you.

MR. FRANGOS: Thank you, Mrs. Dahl.

Mrs. Louis Palmer.

STATEMENT OF MRS. CLAIRE L. (LOUIS H.)
PALMER, CITIZEN, RACINE, WISCONSIN

MRS. PALMER: Thank you very much, gentlemen, for letting us tell you how we feel about these things.

My name is Claire Palmer, and I am testifying for the Racine League of Women Voters and also for myself.

The Racine League of Women Voters urges that all aspects of environmental changes be thoroughly explored before any more nuclear powerplants are allowed to operate on Lake Michigan. If more plants are found necessary, the government should develop a rational procedure for locating these plants.

We also suggest exploring any possible alternatives to nuclear power.

And now speaking as an individual citizen and as a lover of all lakes and rivers, I urge you gentlemen to avert further degradation to the lake. Dr. Stoermer's research in indicating that the proliferation of diatoms and phytoplankton species which preceded the explosive algal bloom in Lake Erie is now pretty generally present in Lake Michigan.

Only by strong regulations well enforced can we hope to reverse this trend. I urge this Conference to adopt the thermal discharge regulation suggested by the Environmental Protection Agency, and to arrange strong enforcement procedures.

Thank you, gentlemen.

MR. STEIN: Thank you.

Are there any comments or questions?

If not, thank you very much.

I think without objection now we --

MR. FRANGOS: Mr. Stein, I am sorry, I have one more --

MR. STEIN: Yes. Go ahead.

MR. FRANGOS: -- lady who would like to appear at this time, please.

MR. STEIN: You know -- let's go off the record now.

(Discussion off the record.)

MR. FRANGOS: Mrs. Robert Erickson, please.

STATEMENT OF MRS. ROBERT ERICKSON, NORTH CENTRAL AUDUBON COUNCIL, RACINE, WISCONSIN

MRS. ERICKSON: I am Mrs. Robert Erickson, and I am speaking for the North Central Audubon Council. This is an organization representing groups in seven States which includes Illinois, Michigan and Wisconsin, as well as others that don't border on Lake Michigan.

I am going to speak first about pesticides and then something about nuclear powerplants.

We are concerned about the pesticide problem in relation to Lake Michigan. I myself sat through approximately 2 weeks of pesticide hearings before the Department of Natural Resources last year on the problem of DDT. DDT is not a problem in relation to the drinking water of Lake Michigan. At the time of one of these Enforcement Conferences, the Governors very carefully drank water out of the lake and jokingly said that the DDT was not much of a problem, and it is not a problem in drinking water. The only way that DDT is a problem in relation to Lake Michigan is as it builds up in the food chains.

We have materials showing that the fish of Lake Michigan -- many of them -- have a very deleterious amount of DDT present. Some of them show from 5 to over 20 parts per million of total DDT in their flesh. The Federal standards for DDT, I believe, are around 5 parts per million. So that many of the fish that are caught in Lake Michigan are not fit for interstate shipment.

I think the Enforcement Conference has been lax in not realizing the seriousness of the DDT problem. I think they have been lax in not completely banning the use of DDT and other chlorinated hydrocarbons in the four States adjoining the lake. I think the Federal Government should also step into this picture.

You will note, if you read the statistics that are put out about Lake Michigan fish that the introduced fish have just as high or higher parts of DDT as the other fish. The brook trout, the lake trout have larger numbers. The brown trout found with 7 parts per million -- the brown trout range up, some of them, to 14 parts per million. These were largely caught in Door County, where the DDT use has been heavy for the cherry orchards. The seagulls off Door County had up to 400 parts per million in their flesh, and were not reproducing at that time.

The rainbow trout have high amounts. Even the coho, which is our fabulous new sport fish, ranges up to 16 and 19 parts per million many times.

Because of this, the Audubon Council would like to say that we should protect the ecosystems of Lake Michigan. We believe that DDT and the chlorinated hydrocarbons should be banned by the four States adjoining the lake, and in addition should be banned on a National level. The "agrichemical" industry for short-term profits should not be allowed to pollute the food chains of Lake Michigan.

Now, I will turn to something in relation -- two things in relation to powerplants. We are concerned about radiation in a similar way. Radiation can build up in the food chains in the same way that DDT can build up in the food chains. Dr. Malcolm Peterson has published some information from the Hanford Plant in Washington where Zinc-65 was present in the waters below the Hanford plant. This was at quite a low level and the algae and the micro-organisms, then it was picked up at a higher level by the small fish and a higher level still by the larger fish. It was also picked up in the plants that were irrigated by the waters of this stream, and then the cows, and so forth, that fed on these plants further concentrated this radiation.

They found that -- in the river -- there were a very low level of heat of picocuries -- 188 -- in the drinking water. A man who had been using this for drinking water ended up with 4,000, but a man who drank the milk and ate the beef that had fed on the plants irrigated with this water had 36,000 picocuries.

So you see, at this point, man was getting to be the top of one of these food chains where radiation could concentrate.

You can do the same thing with things such as cesium 137. If the lake had only 50 percent of the atomic energy standards, and one ate a very large fish from this lake, he would from that one fish -- one pound of it -- he would have his whole body burdened of cesium from that one meal.

I am not implying that our plants are going to be necessarily polluting Lake Michigan with zinc 65 or cesium 137. But I am just using these as examples of the way that small, tiny amounts of radiation, even in parts per billion, and so forth, can build up in the food chains and become a dose which is much higher than man or animals, for that matter, should be allowed to have.

I would like to say, because of this, that we should not put all our power needs, our power eggs into one fishing basket. Perhaps we should be putting more funds into developments of other types of power sources. People are talking about, for instance, the breeder reactor and molten salt method, which is a cleaner process. Now, I realize this is a little bit of pie-in-the-sky still, but maybe that will be a cleaner way of producing power.

I understand that our sources of uranium that we are now using for our powerplants may be gone within 25 years. Perhaps it is a bad thing to use up so much of this uranium. When it's gone, it's gone.

Another thing we might be looking forward to is fusion. The thought now is that a fusion reactor will be much cleaner than our present reactors.

In addition to these, perhaps we should be thinking of other alternate sources of power. Geothermal power has been used in other parts of the world and it has been used in Iceland and Australia, England, I believe, and I think we now have a new plant in the western part of the United States. As far as I can see, this has almost no effect on the environment that is particularly deleterious.

Another method that is new is MHD, magnetohydrodynamics. I understand that its use of coal is much more efficient than our present uses of coal.

A third method would be the use of a fuel cell. There is a fuel cell that works from municipal sewage and makes electricity and is a by-product of fertilizer. This is called complete recycling and maybe this is what we need to be doing.

There is also electrogasdynamics. The Northern Environmental Council which deals with the northern part of Wisconsin and other States in that area has suggested that there could be tie-ins between the Missouri Basin, the Bonneville Power, and our own system, an inter-tie that would enable the peak loads of the early evening to be met more easily.

They have also recommended that there could be low head bulb-type turbines put into the Mississippi. The Mississippi has quite a few present navigation dams, and we didn't use to have turbines that would work in these, but we do now have a low head turbine that would work in these dams. Turbines could be installed there without any particular detrimental effect to the environment, than the already installed dam.

If we would put equal funds into some of these types of alternative power, alternative types of power, we could probably now have an alternative method that might be much less disastrous to the environment.

In addition, there are other things we could do to help our electric power structure. The electric power system has been doubling every 10 years in its demands and I believe the last doubling was 7 years.

Did you all know that if it kept on doubling at this rate for 300 years that, at that time, the whole of the United States would be covered by powerplants? Something has to be done. We can't go on forever.

MR. STEIN: That is better than having these conferences continue that long because you would be surprised what the United States would be covered with by then. (Laughter)

MRS. ERICKSON: Another point is that we might change the rate structure -- I don't believe that the rate structure reflects the true economic picture. It seems to me that we could have a rate structure that would discourage the large uses of power. It may reflect the economic picture to the power company right now, but I do not believe it reflects the economic picture of the deleterious effect on the environment.

We also think that it might be well that the advertising cost be omitted from the basic rate charge. An electric utility is a public utility and really does not need to advertise.

There are also problems in connection with siting. I personally am very much opposed to siting powerplants immediately adjacent to natural areas, and it seems to me that all of the big new powerplants have been placed thusly around Lake Michigan.

If you were a person who enjoys Zion Park, you can't really enjoy the park now because you have to look at the towers of the new nuclear plant, and if you go to Point Beach there are two plants near to that one, although they are not as close. If you go over near St. Joe, Michigan, the new plant there by the Grand Marais is right in an area which is trying to be set aside as a State natural area.

So I do think we need a change of siting, and I do feel that plants could be put back from the lake a ways so that they do not destroy the beauty and use of the lakeshore.

Now, in conclusion, I would like to say that the Audubon Council recommends that powerplants on Lake Michigan emit as little radiation as possible into Lake Michigan -- if possible, zero radiation -- and furthermore that Federal funds should be used to find alternate methods to promote, develop, and encourage these so that we can find better methods of producing electric power.

Thank you.

MR. STEIN: Thank you very much.

Are there any comments or questions?

MR. PURDY: Yes, Mr. Stein.

Several people, during the course of this Conference, have touched on the matter of radioactivity and the concentration of radioactivity in the effluents from the nuclear reactors.

As I understand the legislation and the finding of the Federal Court in Minnesota, that this field has been preempted from the States, and that this lies exclusively in the authority of the Atomic Energy Commission. Is this correct?

MR. CURRIE: Mr. Chairman, if I may comment on that, the Illinois Pollution Control Board has recently taken the contrary position. We believe we have the power to regulate radiation.

MR. STEIN: I think the Minnesota Board took the same position the Illinois boys have.

I don't want to comment on that. If an AEC spokesman is here, he can speak. This is an interpretation of the Atomic Energy Commission law, and --

MR. PURDY: I think the Federal Court in Minnesota -- and until that decision is appealed -- found that this is the case; and we are at the State level continually pressured to adopt something different, something more restrictive than the regulations of the Atomic Energy Commission; and I feel here that this is a matter that ought to be clarified at the Federal level. There are a number of people that feel that pollution control ought to be turned over to the Federal Government at the Federal level exclusively. I don't happen to hold to that particular theory. I think we need each other. But here is a case now that the Court in Minnesota has decided is the case but yet the people are not satisfied with it.

MR. STEIN: Well, I cannot speak for radioactivity because that is handled by a special statute, but it is perfectly clear that in the Water Pollution Control Act, or under the Water Pollution Control Act, and Federal water quality operation, the primary rights and responsibilities rest with the States, and they can adopt more restrictive requirements if they wish.

Now, I have been in this for 25 years, and I have rarely seen a State exercise that kind of option. It always seemed to me that the Federal Government was asking for a stricter one, so I know you may have problems in radioactivity because of the law. But you surely have an open field in water. If you want to be more restrictive than we are, just come forward and say so and I will be glad to doff my hat.

MR. PURDY: Well, I hope that is true, Mr. Stein, from the standpoint of pollution control from recreational and commercial watercraft. (Applause)

MR. STEIN: I hope so. I don't think — as a matter of fact, I am not sure that you and your predecessors were with me on Lake Erie, Lake Michigan and Lake Superior Conferences. As far as I was concerned when we were dealing with watercraft, we didn't have a difference of opinion.

MR. PURDY: None whatsoever on that, but the proposed regulations that we had an opportunity to review pretty well cut the ground out from under the very good foundation, I think, that we were able to build in the Lake Michigan, Lake Erie, and Lake Superior Enforcement Conferences.

MR. STEIN: I have no comments on those regulations.

MR. PURDY: We did.

MR. STEIN: Are there any other comments? You know I would like to take this chance to comment on one aspect of your statement, and that is on your radioactive cumulative effect of Zinc-65 and that kind of material.

Years ago -- I guess in the fifties -- we had cases involving the uranium industry and the Colorado River and the Animas River particularly.

That portion of the speech seemed almost word for word like the perorations -- statements that I was making at that time. I figured this is a fair time for cultural lag. Sometimes you feel your work isn't all lost. It is only about 10 or 12 years before the citizens groups pick it up.

MRS. ERICKSON: I am sorry we are so slow.

MR. STEIN: Okay. But on some of the other stuff you seem to be faster.

Are there any other comments or questions?

MRS. ERICKSON: I think I would like to say it would be nice to have the State standards much stronger than the Federal ones in regard to radiation.

MR. STEIN: Again, let me — I think we all have to recognize this, and I think this is fair to say. I don't know if the AEC wants to come up here or not. This is not really the forum to change the law, but we are a government of laws, not of men.

Now, we do know in the law that it seems — and I agree with Mr. Purdy — unless the Court decisions are reversed, it seems to me that the Courts and the AEC is contending that the Atomic Energy Act may have preempted State activities in certain measures of the radiation field.

I do think in the labor field there have been numerous decisions which have said the same thing, and if people don't like the law, of course, the Congress is the place to change it.

Mrs. R. Erickson

I do think, too, though that in developing the water pollution control law in this country, while we may have made many, many, many mistakes -- goodness knows we have, and I probably am associated with as many as anyone because I have been around so long -- we were aware of this situation from the very beginning. I look at these fellows at the table, their predecessors -- Blucher Poole from Indiana; two predecessors to Mr. Purdy, Mr. Adams from Michigan, and myself; I think the Illinois representative Mr. Klassen -- and this was back in the late forties, we all recognized this situation.

In consequence of this, I think, if you read practically the first sentence of the Federal Water Pollution Control Act -- and this has been in there since 1948 -- it states that the primary rights and responsibilities for water pollution control rest with the States. That is stated in every Act, although, as you know, it has been amended numerous times since.

In other words, this is one of the problems we have avoided in the field that we are in, and we have fully preserved State rights, and State prerogatives here. I think in this spirit we should try as much as we can to take advantage of that.

MR. MAYO: By way of observation, Mr. Chairman, I wonder if what Mr. Comey presented to us this morning doesn't stand out as a fairly striking lesson in terms of whether or not the argument of whether the Federal Government is going to preempt the State Government on some of these issues is passé, because I think we have been advised that the agreement reached between the conservation groups as intervenors in the Palisades case demonstrates that outside of the Federal Government and the State Government, there is a route by which the citizen can come forth, in a variety of forums, have imposed on a particular discharger a series of constraints that perhaps are considerably more severe than either the State Government or the Federal Government would currently consider imposing.

MR. CURRIE: Mr. Chairman, if preemption is no longer important I wish somebody would ask the Congress to stop putting it in their statutes.

MR. STEIN: Well, I didn't say that. This is an interesting observation. If individual action by citizen groups will make the State and Federal action of government passé, maybe we have entered into a new era of brotherly love. I think I will have to check with my sister in Philadelphia on that. (Laughter)

MRS. ERICKSON: Thank you.

MR. STEIN: Are there any other questions and comments?

MR. FRANGOS: Mrs. Erickson, we thank you for stimulating this interesting dialogue.

MRS. ERICKSON: All right.

MR. STEIN: By the way, I do have a sister in Philadelphia.

MR. MAYO: Does she love her brother?

MR. STEIN: Oh, yeah! Don't push that too far though! (Laughter)

Do you have any more?

MR. FRANGOS: No, that completes our citizen participation.

MR. STEIN: Well, let's go State-by-State.

Michigan?

MR. PURDY: These are comments now other than --

MR. STEIN: -- other than -- and what we are going to do is run this through the States as we did before.

You will get one shot and then we can come around to you again.

JAMES B. HENRY: Mr. Chairman, do I understand you are now going to something other than thermal effects?

MR. STEIN: No. Let me make this clear. I said and asked the conferees: We are not foreclosing thermal effects but because we have many citizen groups coming, who have come here at their own time and expense, and they have many pressures, the judgment that I gave to the conferees, and I heard no dissent, was that we were going to call on the citizen groups first. Then we would give the whatever industries were here full time to talk about thermal effects.

MR. HENRY: Well, speaking on behalf of Indiana and Michigan Electric Company, I object to that procedure. I think we should be entitled to go ahead in order with our presentation on thermal effects.

MR. STEIN: With that objection, I will poll the conferees and ask them whether they want to hear the citizens or the industries first.

MR. PURDY: Can we find out how many citizens we have left? I have two from Michigan, both absent. Mrs. Botts will represent both.

MR. MILLER: I don't have any that I know of.

MR. STEIN: How about you?

MR. CURRIE: I don't believe we have any. Mr. Blaser had the list but I think it is exhausted.

MR. STEIN: How about Wisconsin?

MR. FRANGOS: I think we are finished.

MR. STEIN: I think this is a moot question.

MR. HENRY: Very well. I withdraw the objection.

THE REPORTER: Who was that from the floor?

MR. STEIN: Oh, pardon me. Would you identify yourself?

MR. HENRY: Yes. James B. Henry, Vice-President and General Counsel of American Electric Power Service Corporation.

MR. PURDY: I have a request from Mrs. Carole Magnus, Secretary of the Manistee County Anti-Pollution Organization; and Mrs. Kathleen Nixon, Secretary of the Mason County Anti-Pollution Action Council. Both asked for an opportunity to present a statement.

I understand that they are not present, but that they have presented their statements to Mrs. Botts to give on their behalf.

MR. STEIN: Mrs. Botts, we can't do without you. Please let us have your attention.

MR. PURDY: The statements from the Manistee County and Mason County Anti-Pollution Committees.

STATEMENT OF THE MANISTEE COUNTY ANTI POLLUTION ORGANIZATION (MACAPO)

(READ BY MRS. LEE BOTTS)

MRS. BOTTS: Thank you very much.

I have been requested by the Manistee County Anti Pollution Organization in Michigan to read the statement in their behalf concerning the chloride input into Lake Michigan.

Mr. Chairman, conferees and representatives: MACAPO was established in April 1970. The purpose of the organization was to select the worst pollution problem in the Manistee area of Lake Michigan and aggressively work toward its correction.

Since that time, we have pinpointed dozens of sources of pollution in violation of Michigan State law and Federal law in the Manistee area alone.

Our evidence was sufficient to warrant two Federal investigations by the U.S. Corps of Engineers and the former FWQA.

The publicity brought about by our investigation and publication of the facts regarding pollution in the Manistee area brought the Michigan Water Resources Commission to Manistee for its January meeting. At this meeting we heard that some timetables for pollution abatement have been set, but the two major sources of pollution in the Manistee area of Lake Michigan are not part of this timetable as yet.

We of MACAPO can see that some progress is being made. Some stipulations have been signed. However, we have our files full of previous Orders of Determination and know that the amounts and levels of pollutants allowed by these Orders of Determination and the amount that actually has been discharged has been entirely different in numerous cases.

At the WRC meeting in January, some dates were given and the public was told that vast sums of money will be spent to abate pollution. But, this is not anything that has not been promised before. Therefore, we must and have taken the attitude that when we see it, we will believe it.

All of the antipollution measures now taken, however upgrading, still does not legalize the numerous violations of the 1899 Rivers and Harbors Act of the Federal Water Quality Act. These were illegal then, and they remain illegal. The courts must decide what action is deemed appropriate for these violations.

It is very gratifying to us that because of facts presented by MACAPO that two Federal investigations have been ordered. But, what good does it do to order the investigations if the Environmental Protection Agency and the U.S. Corps of Engineers do not have the staff to do the investigation? For it is these agencies that must collect the evidence and submit same to the United States Attorney before prosecution of violators can commence.

The United States just spent another $400 million putting two more men on the moon. Many Americans seriously question the sanity of such an expenditure. How can we justify spending this fantastic sum exploring the moon to bring home rocks, when over half of the American fresh-water supply is either poisoned, dead, or on the verge of disaster?

America is still on a collision course with oblivion. We have not yet accepted pollution as the national crisis it really is.

MACAPO has been criticized when we ask if the State of Michigan is looking for an obituary list as proof that pollution or injury is occurring.

MACAPO has requested the precise Michigan Water Resources Commission definition of the word "injury." It was stated that some things cannot be put down in black and white. It is the opinion of MACAPO, that if the

Michigan Water Resources Commission cannot precisely define the word "injury," then they cannot use the word.

By the Michigan Water Resources own admission, 5 Michigan industries contribute 50 percent of the total chloride input to Lake Michigan. MACAPO has been working to see a cease and desist of chloride disposal to surface and ground waters.

On October 2, 1970, MACAPO made a presentation to the Lake Michigan Enforcement Conference Workshop, at which time we outlined the vast tonnages of chlorides presently contaminating Lake Michigan from industries in the Manistee area.

The chloride problem of our area is not to be taken lightly, but at the same time, we are amazed and appalled by the lack of compatible standards with our sister States on the Lake Michigan shoreline. We of MACAPO, do not understand why a standard of 50 parts per million is allowed by established standards of Michigan, while our neighbors to the south, Illinois and Indiana, hold to a standard of 9 parts per million.

As you are aware, the Special Report No. 11 issued by the University of Wisconsin -- Milwaukee, Center for Great Lakes Studies under the direction of Dr. A. M. Beeton, has issued a very vivid graph in Figure 10,

Mrs. L. Botts

page 30 "Changes in the Chemical Characteristics of Lake Michigan", shows a very precise chloride part per million count soaring past 8 parts per million, and if not in fact surpassing the 9 parts per million allowed by our neighboring States.

This, gentlemen, in essence says to our sister States of Illinois and Indiana, by the standards set, you can no longer have any chloride discharge to Lake Michigan since the lake is already at the maximum level set by the standards as approved by the Department of the Interior.

How pathetic that we are all to sit and count our chloride input to Lake Michigan and divide it by the total volume of Lake Michigan and say that we will never reach a given parts per million. It is unfortunate when intelligent people will add chlorides in this manner and disregard all those operating on the same basis.

Let us, just for once, sit down and consider the whole chloride problem as contributed by large and small discharger alike, and then in retrospect we can see the problem as it truly exists.

When we are to consider that the chloride standard that Michigan has elected to select for its maximum part per million count is so far greater than any other State bordering on Lake Michigan, are we not being

Mrs. L. Botts

unfair about the amount of chlorides that Lake Michigan can realistically absorb?

MACAPO is told repeatedly that the exceptionally high chloride count in the Manistee area exists because the term "mixing zone" exists. To date, we have not had a specific definition of "mixing zone" and can only conclude that the term "mixing zone" applies to any area where the part per million count is in excess of a given standard.

In conclusion, in view of the aforementioned facts, we of MACAPO wish to make the following recommendations for upgrading Lake Michigan and urge their immediate consideration and adoption.

1) Since Lake Michigan is a contiguous body of water effecting four States, we urge the establishment of uniform water quality standards, nullifying the individual State standards approved by the Department of the Interior. These new uniform water quality standards to be set as high as is technically possible, allowing an absolute minimum of pollutants to further degrade Lake Michigan.

2) Establish a uniform set of effluent standards, rather than using Lake Michigan as a test tube for mixing and diluting all types of pollutants.

3) Immediately press for adequate funding and

staffing so that the agencies empowered by law to preserve Lake Michigan can function with the least amount of delay and red tape.

Conferences are fine to a point, but if aggressive, positive action does not displace rhetoric, Lake Michigan will be lost, just as we have lost Lake Erie and Lake St. Clair.

That concludes the statement from the Manistee County Anti-Pollution Organization sent to me by Mrs. Carole Magnus of that group.

STATEMENT OF THE MASON COUNTY ANTI POLLUTION ACTION COUNCIL (MACAPAC),

(READ BY MRS. LEE BOTTS)

MRS. BOTTS: The second statement is from the Mason County Anti-Pollution Action Council of Michigan, and also concerns chlorides. I am sorry I don't have copies of this second statement, but I will supply this to the reporter. This report is similar in content to the one which was presented at a public meeting held by the Michigan Water Resources Commission in Manistee on January 21, 1971.

This organization, the Mason County Anti-Pollution Action Council was formed in September of last year to study and act upon the pollution problems of our area. We now have information on a number of different pollution problems there.

We will limit ourselves in this paper to only one problem. That is, chloride discharges into Lake Michigan from a pipeline between Ludington and Manistee. In our paper we will draw from data from the Water Resources Commission Industrial Wastewater Survey Reports and from the minutes of the Michigan Water Resources Commission meeting of January 21, 1971. We will use these data because they are the most reliable and authoritative we have.

The Industrial Wastewater Survey Report is that of the Dow Chemical Company of Ludington, Michigan, for November 3-5 of 1969. This report is approximately 16 months old at this time.

Dow Chemical Company processes brine. It discharges effluent containing concentrations of chloride into Pere Marquette River. In addition, Dow discharges effluent containing high concentrations of chlorides into Lake Michigan by way of a 14-inch diameter pipeline which runs from the plant in Ludington to a point approximately 9,000 feet north of Point Sable and 500 feet from shore in about 15 feet of water. This pipeline has been in existence since 1943. In the meeting of January 21, 1971, the Water Resources Commission admitted that five point sources supply at least one-half of all chlorides into Lake Michigan. Three are in Manistee and two in Ludington. The two in Ludington were named as The Dow Chemical Company and the Harbison-Walker Company.

We would like to draw your attention to some figures for the discharge of this pipeline. For the first survey period from the third to the fourth of November, the total solids discharged were 3,190,000 pounds per day. The total chlorides discharged was 1,693,000 pounds per day. The concentration of chlorides was 145,000 milligrams per liter. For the second survey period, from the fourth to the fifth of November, the total solids discharged were 1,448,000 pounds per day. The total chlorides discharged was 794,000 pounds per day. The concentration of chlorides was 68,000 milligrams per liter. We understand that Dow is participating in a voluntary program to restrict and control the polluting content of their waste discharges. We have requested information on the subject from Dow but have not yet received any.

Note that we are talking about millions of pounds of chlorides and concentrations in the thousands of parts per million. The quantities of discharge over a long period of time have amounted to astronomic proportions.

Mrs. L. Botts

The concentrations of chlorides as they come from the pipe are vastly greater than any acceptable standard which we know of.

We understand that the discharge of these heavy concentrations of chlorides have been permitted with the concept that there is a mixing zone where these chlorides are mixed and diluted with the freshwaters of Lake Michigan. We submit that, in practice, the definition of a mixing zone is that quantity of water required to dilute an unacceptable effluent to an acceptable level. By this logic it might be reasoned that no discharge would be unacceptable until the entire lake failed to meet the standards for discharge waters.

We also understand that, at present, one must prove injury before action can be taken to abate a particular pollution problem. In practice, injury has been interpreted to mean obituary and regulation impossible until the damage is done.

The primary fault is not with Dow. Dow has 400 employees in Ludington. The community depends on their presence. It would be pointless to act against Dow and not against other firms which may do the same thing, perhaps in other States. What Dow has done is neither illegal nor unreasonable under the circumstances. The fault is in the circumstances.

What is needed is: 1) regulation of industrial waste discharges with uniform standards based on ecologic principles; 2) that the regulations be enforceable; 3) that there be sufficient personnel and funds to enforce them; and 4) that there be additional technical and scientific personnel and funds to find solutions, if possible, for problems for which there are presently no solutions.

We are concerned about the pollution problems of our lake and elsewhere. Our ability to affect these problems is limited. Representatives here have the power to affect these problems if they will act. The primary fault is, therefore, inaction.

I thank you very much. I have already discussed with Mr. Purdy the statements and I am sorry I cannot answer questions on behalf of these groups; I can only present their statements.

MR. STEIN: Thank you. Are there any comments or questions?

MR. DUMELLE: Mr. Stein, I would like to ask Mr. Mayo, as the result of the Federal investigations at Manistee, what action is planned if any on this discharge of 1,500 tons of salt to the lake every day, and what action if any is planned at this other discharge we just heard about in the Ludington area?

It seems to me the whole business of saving the lake is tied up in this particular instance that we are hearing about here. Chlorides are persistent. Chlorides are not desired in a freshwater body. We have got a standard here which is very low; it is very loose — 50 parts per million. The Illinois standard is 9.

It seems to me we are permitting degradation and we have heard a lot of talk about Federal action. I still haven't seen it in Iowa, because you said the decision is deferred there, and I just wondered what has happened here in the investigation that I know went on up there last August.

MR. MAYO: Well, first, I think it would be appropriate if we could permit Mr. Purdy to make — he indicated he desired to make a statement, and I think let him have an opportunity to apprise the conferees of the State program of remedial action which I understand is under way.

As far as I was concerned, I think I have to express resentment at your comments, Mr. Dumelle, because the Federal Government did, in fact, in the case of Iowa, take a positive action. It did promulgate Federal standards. It went as far as the statute would permit it to go. The Governor of Iowa requested the hearing process be initiated, and there are activities going on now that I mentioned to you earlier -- the meeting of the Iowa Pollution Control Commission tomorrow. I understand it is to address itself to a variety of matters dealing with Iowa water quality standards.

MR. DUMELLE: Mr. Chairman --

MR. STEIN: May I make a suggestion? I don't want to cut anyone off. Mr. Dumelle, I am going to give you a last word on this, but I can't help feeling that any acrimonious discussion in particular to Iowa is not going to get us very far in the Lake Michigan problem. But go ahead.

MR. MAYO: I defer to Mr. Purdy.

MR. DUMELLE: I would like an expression of what the Federal Government is going to do in these particular polluting cases.

MR. STEIN: Do you want to respond now, Mr. Purdy, or not?

MR. PURDY: Well, I wanted to make some comments with respect to the statements, and I did not intend to comment in detail on the statements.

My silence on many points of the statements does not mean that I am in agreement with what has been stated.

Mrs. L. Botts

I do hope that we can agree with the Manistee County group that some progress is being made.

Now, from the standpoint of chlorides, this mentions the Michigan Water Resources Commission meeting of January, and I don't want to leave the impression that the Commission waited until January of 1971 to look at this problem in detail.

In fact, Mrs. Magnus was present at a Water Resources Commission meeting in June of 1970 where the same problem was considered, and the only reason we are at the point that we are now is that a great deal of groundwork has gone on in the past.

But I would say that the Commission last summer looked at the matter of chloride discharges into Lake Michigan, and they looked at many reports from the standpoint of what the problem might be, and one of these reports is a report published by Mr. Ownbey and Mr. Willeke on behalf -- I would guess -- of the Great Lakes Illinois River Basin Project. It was published in one of the annual reports of the Great Lakes Research Conference about 1966. And at that point in time, they very flatly stated that from the standpoint of the lake as a whole that they were not concerned with the chloride or sulphate input into the lake from the standpoint of causing an injury.

Mrs. L. Botts

Now, even though there was a great deal of information to indicate that chlorides were not, say, a problem or one that could be forecast in the immediate future, soaring past 8 milligrams per liter, I don't know — there are not too many waters in this country that will meet that level.

But looking at the inputs to the lake, we did find that on the basis of estimates that my staff was able to make of the inputs that might be made into Lake Michigan from Wisconsin, Illinois, and Wisconsin, and then the data that we had available from Michigan, that we had five point sources that could represent 50 percent of the annual input of chlorides to Lake Michigan. The Michigan Water Resources Commission did not believe that this is the best and wisest use of either this brine resource or of Lake Michigan, and that the impact of these certainly was felt upon Lake Huron, Lake Erie, and the entire Great Lake system. And so, therefore, they asked the staff to immediately contact these companies and develop a program that would reduce this chloride input to minimum levels by December of 1972. We have proceeded on that program.

I am positive that at least three and possibly four of the companies now have signed binding agreements with the Michigan Water Resources Commission to carry out this program and, in fact, there will be some very substantial cutbacks yet this year, and we intend to carry forward on this program. So I think action is well under way to bring this problem — if it is a problem -- but certainly to conserve this resource, and that action is under way to do just that very thing.

MR. STEIN: Do you care to make a further response now, Mr. Dumelle?

MR. DUMELLE: Yes. I think the significance here lies in two points. One is that, whether the chlorides in Lake Michigan are 8 parts or 9 parts and we can go up to 50 or 200, we are still permitting degradation when we have sources such as this that can be controlled, and I think the Federal Government should be looking at that particular point.

Secondly, we have the whole business of the jurisdiction of the Conference. These industries — at least the Manistee ones — I am not familiar with the others — were never listed as being under the jurisdiction of this Conference, and they were never listed because Michigan chose not to list them, and I think that is because each State chose for itself what pollutant and what polluter affected the quality of Lake Michigan and there were no guidelines. And perhaps if I were in

Michigan I would have done the same thing. But I think it points out the ineffectiveness of the Conference procedure, as it is presently drawn, and I hope when we get to the compliance schedules that somewhere in there we can work out procedure for taking another look at all these other industries.

MR. PURDY: Mr. Dumelle, you are pushing me to the same point that I have to make the same comment that Mr. Mayo did and I resent some of your remarks, because --

MR. STEIN: Could you wait? Let me try to do this.

I appreciate what Mr. Purdy is going to say, and maybe I should let him talk now, but let me try to state the facts straight. We didn't permit the States to pick their own polluters or pollutants. The conferees came up with a program on certain municipal and industrial wastes. Chlorides were not included, and if the chlorides were not included, this was a defect of the Federal conferees as well as the State conferees, including Illinois.

Now, to my mind, this does not, on the contrary, point up the defect of the conference procedure; this points up the essential strength of the conference procedure because if anything has been overlooked

-- and you very well may be right on the facts, Mr. Dumelle, that something is overlooked -- any laxity on the part of any governmental agency or on the part of an industry is open to continuous scrutiny and rectification in the repeated meetings of the conference.

Now, as I see this, we have three alternatives as far as our problem:

1. Either the dischargers are a violation of the 1899 Act and they are putting out an industrial waste without a permit and maybe we should move to stop it, we have to get the specifics on that to see if we can move.

2. The second point is maybe we didn't cover this in the conference, or maybe the conference should cover chlorides. If this is your proposal, certainly as chairman I am going to make this open to the conferees and let them see if they want to include chlorides in this.

3. Thirdly -- and this is another hat, as you may know, that I wear -- evidently the different States in Lake Michigan have different standards for chlorides.

The much maligned State of Iowa has joined with us on the Mississippi and the 9 other Mississippi States -- 10 States in all -- to come up with uniform temperature standards for the whole State of Mississippi or the whole

Mississippi River, which was a difficult job indeed.

We have four States here. If you feel that the four States have differences in the chloride requirements which are impeding different State programs and may not adequately preserve the lakes, just let us know, I will get the four States together. We will try to come to an agreement on a chloride standard, and then we will ask you all with us to put this through the requirements and get them all to line up the same as we got the Mississippi States to line up, including Iowa.

Now, these are the three things I see and they can all work simultaneously.

By the way, I hope you have cooled off by now, Mr. Purdy. (Laughter)

MR. PURDY: Not entirely.

MR. STEIN: Go ahead.

MR. PURDY: First of all, I resent the statement that we have not included this information to the conferees, because in all of our listing of industries and municipalities, and any of the reports that we have made to this Conference, we have listed all of the industries, all of the municipalities within the entire drainage basin of Lake Michigan.

Now, from the standpoint of those that we said had an effect on Lake Michigan and came within the time schedules established by this Conference, we relied upon the conclusions reached by the conferees at earlier Conferences. And I know, at this time, of no conclusion that related to chlorides and found that chlorides discharged into Lake Michigan from any State affected or endangered the health or welfare of persons in another State.

Now, if there is information in the record of this Conference to show this finding -- or at any other -- I am ready to bring those -- or that information to the conferees with time schedules and place them under the jurisdiction of this Conference.

But until there is that finding, I do not believe that I need to place those industries under the time schedules here.

Now, secondly, there are many ways to accomplish things, and earlier you pointed out the primary jurisdiction of the State to carry out some of these actions. I think this is now under way. I think it is under way under a timely basis, and I hope that we do not delay programs that are now already under way and will go to their completion.

MR. STEIN: Mr. Dumelle.

MR. CURRIE: Mr. Chairman, did I understand you to say that the subject of chlorides was not a part of this Conference?

MR. STEIN: I did not. If you understood me to say that, I don't believe I did, and I don't believe I intended to say that. The subject of chlorides certainly can be a part of this Conference. We put it on the agenda.

MR. CURRIE: I was just going to remind you of that. What was it you said?

MR. STEIN: I said -- let me repeat again what I said -- that if you wanted a chloride requirement in this Conference all you had to do was write it up, because I said that was one of the strengths of the Conference technique, that we constantly bring up new items.

MR. CURRIE: Mr. Chairman, I hereby bring it up.

MR. STEIN: All right.

MR. CURRIE: Mr. Chairman, I move that --

MR. STEIN: Wait a moment. Wait a moment.

MR. CURRIE: I move that that item be added to the agenda of this Conference.

MR. STEIN: Now, let me make a suggestion to you -- and I also said that there were three ways that I thought we could handle this: 1) go 1899 with the State; 2) the route of getting all of the States to dovetail their standards -- maybe we should do all three --

and 3) bring this up as part of the Conference. (See pp. 478a,b)

However, I would like to suggest that the representatives of the power companies were kind enough to withdraw their request for a statement now. I think they did this on the assumption -- at least the assumption I had -- that we had a couple of short statements.

Unless we hear from other public people, perhaps we should honor the requests of the power companies to put in their statement now, and then have a full discussion of the chloride problem at the conclusion of that. Is that agreeable?

MR. CURRIE: I believe there is a motion on the floor, Mr. Chairman.

MR. STEIN: Right. All right, now, let's see what you want --

MR. FRANGOS: Mr. Chairman, I would like to comment that I concur in your suggestion that we ought to address ourselves to the thermal question and let's see if we can't get one item at least somewhat closer to some conclusion and then take up some other item. We are just wandering all over the place here at this point.

MR. MAYO: I agree, Mr. Chairman, since chlorides are specifically mentioned on the agenda.

MR. STEIN: All right. Let's poll the States.

STATE OF ILLINOIS
POLLUTION CONTROL BOARD
189 WEST MADISON STREET SUITE 900
CHICAGO, ILLINOIS 60602

DAVID P. CURRIE, CHAIRMAN
SAMUEL R. ALDRICH
JACOB D. DUMELLE
RICHARD J. KISSEL
SAMUEL T. LAWTON, JR.

TELEPHONE
312-793-3620

March 30, 1971

Mr. Murray Stein
Chief Enforcement Officer
Office of Water Quality
U. S. Environmental Protection Agency
Washington, D. C. 20204

Dear Mr. Stein:

After my public discussion on March 24 at the Lake Michigan Enforcement Conference with Mr. Ralph Purdy of Michigan and Mr. Francis T. Mayo of the U. S. EPA Regional Office on the discharge of chlorides from Michigan you stated to me that you would "sue the companies under the 1899 Refuse Act" if I would provide you with their names.

I then told you that Mr. Mayo's staff had run field investigations at Manistee and that full data were already available but you again repeated your request for the names of the companies involved.

That afternoon I gave to you a handwritten list listing the following companies as putting approximately 1500 tons of salt into Lake Michigan each day:

Morton Salt Company, Manistee, Michigan
Manistee Salt Company, Manistee, Michigan
Great Lakes Chemical Company, Filer City, Michigan
Standard Lime and Cement Company, Manistee, Michigan

The following company was listed as putting approximately 1000 tons of salt into the Lake every day:

Dow Chemical Company, Ludington, Michigan

Since these companies were never listed by Michigan as coming under the jurisdiction of the Lake Michigan Enforcement Conference (See February 25, 1969 proceedings, p. 108-109, 111) there should be no Conference impediment to prevent a suit under the 1899 Refuse Act.

I would appreciate being informed when suit is filed against these companies. I would also request that this letter be made a part of the Conference record of the sessions of March 23-25, 1971.

Very truly yours,

Jacob D. Dumelle

Jacob D. Dumelle
Member

JDD:rj

What do you feel in Indiana?

MR. MILLER: Let's proceed with the testimony from the power people on the thermal question.

MR. STEIN: Mr. Purdy.

MR. PURDY: I would like to hear from the utilities now with respect to the thermal problem.

MR. STEIN: I think I hear a ground swell for that. May we proceed on that basis?

Are there any other -- I just want to go through this for the record -- there are no other people from Indiana; no other people from Illinois; or Wisconsin who wish to make statements now?

I do have one statement in addition -- a statement I would like to put into the record, addressed to Mr. Pancoe from Associate Professor Thomas B. Roos of Dartmouth College, Hanover, New Hampshire.

I think a good portion of this was covered in Mr. Pancoe's statement. I will distribute it to you, but without objection this will appear in the record as if read.

(The above-mentioned statement follows in its entirety.)

22 March 1971

Reconvened Third Session of Lake Michigan Enforcement
Conference
c/o Mr. Arthur Pancoe
1020 South Wabash Avenue
Chicago, Illinois 60605

Gentlemen:

The proposed use of Lake Michigan onshore surface water as a coolant for power-generating nuclear reactors poses a potential threat to the lake for at least two reasons: 1) damage to surface plankton and 2) long-term thermal disturbance.

Constant cycling of virtually all onshore surface waters through the reactors will expose sensitive planktonic organisms, both plant and animal, to a profound thermal shock. Although their duration at elevated temperatures will be short in terms of a human life, even two to five minutes is long in the life of a single-cell organism. The process of cell division, necessary for cell continuity, requires only 5 to 30 minutes, depending on the species. Planktonic organisms have evolved in a relatively stable environment, in which temperature changes are slow or absent. Indeed, many minute plants and animals use small (less than 2^{o}) fluctuations in temperature as signals for developmental change. Brief exposure to elevated temperatures is sufficiently likely to produce change in organism physiology and maturation to warrant a detailed study of the effects of temperature on all of the organisms involved in the specific waters to be affected. I know of no such detailed study on Lake Michigan plankton, but one should be done before risking major, permanent damage. It should be emphasized that the surface algae are the sole base of the food chain on which all lake animal life depends: a reduction in available fixed carbon (i.e., starch and cellulose) will propagate proportionally through the entire ecological pyramid.

Thermal pollution itself poses a special problem for the Lake Michigan Basin. The V-shaped profile of the lake favors a high thermocline, with a shallow layer of warm water overlying a deep mass of cold water: mixing between these two water masses is slow. Complete turnover requires 10,000 years in Lake Michigan. Calculations of heat dissipation must take into account only this limited mass of available diluent water, and not the entire water volume. It is even possible that adding to the heat of the surface layer will slow down water turnover, intensify thermal stratification, and speed the process of deoxygenation of the lake bottom.

I hope that this letter expresses the basis of my concern as a biologist for the planned use of Lake Michigan. The potential damage is great and irreversible. I doubt that adequate information is available to prove that the changes will be benign. Such changes ought not be made until their safety is ascertained.

Sincerely yours, Thomas B. Roos, Associate Professor.

MR. STEIN: With that, let us recess for 10 minutes.

(Short recess.)

MR. STEIN: I have a few statements here; one of Mrs. Mary Helen Dunlop. (See p. 483)

Then I have a statement of Mr. Polikoff of the Businessmen for the Public Interest which will be put in the record, as if read, without objection. (See pp. 484-487)

BOX 583 WILMETTE, ILLINOIS 60091
the Committee on Lake Michigan Pollution

A STATEMENT OF THE COMMITTEE ON LAKE MICHIGAN POLLUTION
TO THE
FOUR STATE ENFORCEMENT CONFERENCE

I am (speaking for) Mary Helen Dunlop, chairman of the subcommittee on pesticides of the Committee on Lake Michigan Pollution.

Our committee is composed principally of citizens of the suburbs on the Lake shore north of Chicago. Our concern is to maintain the quality of Lake Michigan and therefore to prevent anything which might prove deleterious to the Lake.

Therefore, we recommend to the conferees of the Enforcement Conference that they take whatever action is necessary to prevent the use or discard of any persistent pesticide where--or in such manner as--it might enter Lake Michigan by wind drift or flow or runoff.

Businessmen for the Public Interest

FOR IMMEDIATE RELEASE

MARCH 24, 1971

CONTACT: Alexander Polikoff or
David Dinsmore Comey
109 N. Dearborn Street
Chicago, Ill. 60602
(312) 641-5570

RUCKELSHAUS CONGRATULATED ON THERMAL POLLUTION, CRITICIZED ON INDUSTRIAL POLLUTION, BY BPI

The federal Environmental Protection Agency may be standing fast against the thermal pollution of a dead lake, according to Businessmen for the Public Interest, a Chicago based environmental and urban affairs organization.

In a letter today to EPA Administrator William Ruckelshaus, BPI congratulated the federal agency on its firm stand, taken at yesterday's session of the federal-state Enforcement Conference on Lake Michigan, against the prospective degradation of Lake Michigan from future thermal pollution sources. But in the same letter BPI criticized the agency for its failure to deal with present and continuing degradation of Lake Michigan from existing industrial pollution sources.

Alexander Polikoff, BPI's Executive Director, said in the letter to Ruckelshaus that two facts about Lake Michigan must never be forgotten. The first is that the Lake is "already well along the road to eutrophication," and is probably at the "break point" of "drastic and most likely irreversible changes."

The second, according to the BPI letter, is the "frightening prospect" that the degradation of Lake Michigan may be irreversible because, unlike the other Great Lakes, there is practically no "flow through" or flushing of Lake Michigan.

For these reasons BPI called "with the intensity of desperation" for vigorous enforcement of the federal Refuse Act with respect to industrial pollution of Lake Michigan or, as an alternative, for a "best technology" requirement in the Refuse Act permit program now under consideration by the Nixon Administration. Under the "best technology" requirement industry would be required to use the best available technology as quickly as possible to reduce or eliminate its pollution.

Unless one of the two courses of action was taken immediately, BPI told Ruckelshaus, the federal agency might soon be dealing with a "dead lake."

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Director of Urban Research
JOHN BEAR
Director of Communication
JEFFREY FITZGERALD
Research Associate
DUANE LINDSTROM
Research Associate

March 24, 1971

Hon. William Ruckelshaus, Administrator
Environmental Protection Agency
Washington, D.C. 20240

Dear Mr. Ruckelshaus:

We congratulate you on your strong and forthright letter, read yesterday at the Lake Michigan Enforcement Conference, concerning the thermal pollution danger to Lake Michigan. Your recognition that the condition of Lake Michigan requires prompt and vigorous protective action and a "course of caution" where ecological harm may be involved is precisely correct and an important expression of principle.

In view of your strong position on the prospective problem of thermal pollution, we cannot understand your weak position on the present problem of industrial pollution.

It is not thermal pollution that has brought Lake Michigan to its present degraded condition. Industrial pollution is one of the principle causes of that. And industrial pollution may be dealt with promptly and effectively because, as you know, the Refuse Act prohibits the discharge of industrial waste into Lake Michigan. Yet your office has taken the position that the Refuse Act should be subordinated to the ineffective Federal Water Pollution Control Act. Nor has it to our knowledge supported the position of Congressman Henry Reuss and other leading environmentalists that if the Administration's proposed permit program under the Refuse Act is substituted for vigorous enforcement of that Act, the standard to be applied should be "best technology" - that is, no permits should be granted except upon the condition that industrial pollution be reduced and stopped altogether as rapidly as technology permits.

In this connection I call to your attention Congressman Reuss's letter of February 26, 1971 to Russell Train, a copy of which was sent to you on that date. Congressman Reuss there urges the Environmental Protection Agency and the Corps of Engineers to require as a condition of any permit to be issued under the proposed permit program that the permittee provide the best system of pollution control available within an established time table. His specific suggestion is that permits require,

> "that the permittee shall install, use, and maintain one or more systems or methods which, using the best available technology, provide, within the shortest feasible time, for the elimination, or the maximum feasible reduction, of the refuse discharged or deposited by the permittee."

Two facts about Lake Michigan must never be forgotten. First, the Lake is already well along the road to eutrophication. Recent studies conducted under a federal grant show that all of the plankton diatoms associated with "extreme water quality degradation in the Great Lakes system" are already present in Lake Michigan. One of those studies concluded that Lake Michigan is probably at the "break point" of "drastic and most likely irreversible changes in the entire ecosystem." (Stoermer and Yang, Plankton Diatom Assemblages in Lake Michigan, pages 209-10.)

Second, the frightening prospect is that this degradation of Lake Michigan may be irreversible. There is practically no "flushing" action in Lake Michigan. Pollutants which accumulate there, stay there. A U.S. Public Health Service official told the very first session of a Lake Michigan Enforcement Conference that once concentrations of pollutants reach levels which interfere with water use in Lake Michigan, it may not be possible to bring about "any significant improvement in the quality of the Lake waters." (Conference Proceedings, March 2-9, 1965, Vol. 1, pp. 279-81.)

For these reasons it is essential to halt present and continuing degradation of Lake Michigan from existing industrial pollution sources as well as to prevent prospective degradation of the Lake from future thermal pollution sources.

With the intensity of desperation Businessmen for the Public Interest urges you to call for prompt and vigorous enforcement of the Refuse Act with respect to Lake Michigan. If you cannot do this, we urge you to include in any Refuse Act permit program the "best technology" permit requirement.

Unless one of these two courses of action is taken immediately, the Environmental Protection Agency may well be in the position of standing fast against the thermal pollution of a dead lake.

Very truly yours,

Alexander Polikoff

Alexander Polikoff

ALP:eo

P.S. Enclosed for your information is an article on this subject, "Last Chance for Lake Michigan," which will appear in the "Perspective" section of the Chicago Sunday Tribune on March 28, 1971.

STATEMENT OF PRISCILLA ZLATOFF-MIRSKY,
HIGHLAND PARK, ILLINOIS
(PRESENTED FOR THE RECORD BUT NOT READ)

What do I expect from the Four-State Conference:

1. Restrictions on all industry so that Lake Michigan will not be used until after proof has been presented that whatever they do will not upset the balance of nature in any way.

2. A committee to monitor Lake Michigan with representatives from the Conference, industry, science, ecology, including representatives of the surrounding community. This committee must be properly funded so it can do the job effectively for a period of time to equal the life of the industry or the lake.

3. Cooling towers.

4. Complete safety from radioactive accidents at every level, from mining to transportation and storage.

What do I expect from industry such as Commonwealth Edison:

1. An immediate effort to find safer and less wasteful ways to supply electrical power regardless of previous commitments.

P. Zlatoff-Mirsky

2. Public and private recognition that the environment is more important than an unlimited supply of electricity to everyone for any reason.

3. As our electrical supply is in danger of blackouts or brownouts (Commonwealth Edison information), I expect full-scale public education on the wisest use of electricity. Commonwealth Edison will no longer promote the extended use of electricity on one hand while resorting to unproven and possibly harmful methods of producing it.

MR. STEIN: We will call on this end of the table first.

Let's reconvene.

I think we are going to change the order in calling the industry and I will start at the other end of the table first. I will be calling on Illinois, Wisconsin, Indiana, and then Michigan for the power companies. We will go from the inside out the other way around. I want to say that even though this was deferred, I do think this situation on the chlorides is a very important one. I think this merits a full discussion, and we certainly will have it at the conclusion of the power company testimony.

I would just like everyone to bear one thing in mind: We seem to have a seamless web here. We are talking about chlorides in Michigan; we are also talking about closed cycles or essentially closed cycle systems for powerplants. These essentially so-called closed cycle systems have a sneaky little word in them called "essentially," and this means you are going to have a blowdown and if you have a blowdown in that water you are going to have a possible cloride problem to contend with, and I think we have to keep this all in our mind together.

To call on the power companies, first we will call on Illinois. Do you want to call on your power company representative?

MR. CURRIE: Yes, Mr. Chairman. I have a card here that informs me that Mr. Charles A. Bane would like to be heard.

STATEMENT OF CHARLES A. BANE, OF THE FIRM OF ISHAM, LINCOLN AND BEALE, ONE FIRST NATIONAL BANK BUILDING, CHICAGO, ILLINOIS, COUNSEL FOR COMMONWEALTH EDISON COMPANY

MR. BANE: Mr. Chairman, gentlemen of the Conference, my name is Charles Bane. I am a member of the law firm of Isham, Lincoln and Beale, general counsel for Commonwealth Edison Company.

We wish to cover certain points with respect to the matters that have been brought out at the hearings in these past few days, and we will begin as the hearings began with comment on the letter that was submitted and read into the record by Administrator Ruckelshaus of the Federal Environmental Protection Agency.

We take it that it was that letter which caused this Four-State Conference to begin its concentrations as of yesterday morning on requirements for the closed cycle systems for electric utility generating stations.

Mr. Ruckelshaus' letter relied, as we heard it read into the record, primarily upon the "white paper" prepared by the Department of the Interior and presented to this Four-State Conference in September of last year. We were surprised that the Administrator would rely upon the "white paper" in view of the circumstance which may not have been brought to his attention since he was not the Administrator at the time of its preparation by reason of the circumstance that the "white paper" was proved to lack validity at the hearings that were held by this Four-State Conference in September and October.

As a matter of fact, the first order of business, as I recall, at the September hearings, was a revision and modification of the "white paper" presented by its authors who had in the original "white paper" failed to take account of a principle which I believe is well known to every high school student of physics, and that is that heat is not stored in the water but indeed utilizes the water as a conductor of the heat on its way to the atmosphere.

And, as I say, one of the first orders of business at the September Conference was the presentation by the authors of the "white paper" of substantial modifications in the "white paper" by reason of that error and fundamental mistake.

The second reason that surprises us in Illinois that the Administrator would be willing to rely on the "white paper," arises from the circumstance that the authors of the "white paper" were unable or unwilling or both to defend their work in hearings before the Illinois Pollution Control Board, at which our company among others was presenting evidence in contradistinction and on the same subjects as that presented in the "white paper."

The authors of the "white paper" were invited by the Illinois Pollution Control Board to appear before the Board's hearings so that there could be a confrontation and a direct dialogue between the authors of the "white paper" and the witnesses being presented in Illinois, and that invitation was declined.

We, therefore, believe that it can fairly be said that when the Administrator Ruckelshaus relies upon the "white paper" for his recommendation of closed cycle systems, he is relying upon the document, and it is the only one that he cited in his letter, the validity of which has been seriously disputed and which has not been proved.

We come now to the regulations as proposed by the Federal Environmental Agency, and we must say that by reason of the study that we have been able to give them over the past few days — they were not made available to us until yesterday and indeed we had to scrounge in order to obtain a copy — by reason of the study that we have been able to give to them, we are unable to perceive the theme or the objective or the thrust of the regulations.

We would have assumed from Administrator Ruckelshaus' letter that the point and objective of the regulations was to prevent the discharge of heat and heated water into Lake Michigan.

However, the very first sentence of the proposed regulations indicates that neither in part A nor in part B — and those are the only two parts of the proposed regulations — no attempt is to be made to control heat discharges by municipal waste systems, water treatment plants, nor by vessels. Therefore, some conclusion seems to have been arrived at somewhere along the line that some amount of heat can be discharged into the lake but no clue is given as to the principle upon which the line is drawn.

Furthermore, the discussions yesterday with respect to pump storage systems indicate to us that, again, if the matter was thought of at all, there is an inclination on the part of the Federal people to believe that pump storage systems ought to be allowed — at least to some extent — despite the fact that they also discharge heat into the lake, or would do so if they were under construction.

And, then, of course, as a third point, the permission which is given to plants discharging less than a half a billion B.t.u. per hour — the situation which is covered in part A of the regulations, indicates that those plants also subject to the stated limitations in part A are to be permitted to discharge heat into Lake Michigan.

Consequently, as I say, it seems to us that the object of the regulations cannot be to prevent the heat discharge into Lake Michigan because of these very substantial exceptions which are not covered, and as to which the discharge of heat is to be permitted.

It then occurred to us that perhaps an object of the regulations was to carry out what seemed to be the concern of the "white paper" that the shoreline of Lake Michigan should be protected to the greatest extent possible from being heated, and that perhaps we thought, then, that the object of the regulations, as proposed here, was to achieve that objective. And yet, if I analyze part B of the regulations, in connection with part A, you find that whereas the requirement for a closed circuit system applies to those plants utilizing a half billion

B.t.u. per hour or more. The same restriction, of course, is now applied or proposed to be applied to plants that discharge less than that quantity.

We have not made any precise computations but the fact of the matter is that by reason of the distinction drawn between part B and part A of the regulations, an 80 megawatt nuclear plant probably would not reach the half billion mark and consequently would be allowed under part A. So that, whereas the regulations seem to impose restrictions upon the large plant, the fact of the matter is that the plants of a size of 80 megawatts or thereabouts would be permitted without restriction as to number, and it is possible that the entire rim of the lake, under these regulations, could be filled with 80 megawatt plants or less.

And indeed, the thrust of the regulations, if they were to become effective, might be to produce that very result. Those who wish to generate nuclear power under these regulations can do so, given the establishment one 80 megawatt plant, they wish to establish ten 80 megawatt plants. And so it seems to us that that object of the "white paper" is not achieved by the proposed regulations.

Then, we come up with a third objective which might simply be the protection of plankton and fish, if that is what the objective of the regulation is. And yet upon closer study, we find that that cannot be the case, because in the Technical Committee Report of January 1971, which most of us assumed was to be the subject of this Conference, there is a paragraph 10 in which the conferees expressed their concern -- and I must say in our view quite properly -- that the benthos and the phytoplankton and the zooplankton and the fish might be affected in Lake Michigan by reason of the intakes of various industrial and municipal water supplies. And yet we find that that paragraph 10 is ignored, not taken account of, in the regulations as proposed here for study.

Consequently, it seems to us clear that it cannot be concern for fish and plankton life that the regulations are attempting to base themselves upon. Consequently, in summary, we are confused as to what the regulations are attempting to achieve, and certainly there are no guidelines because within the regulations themselves nor in the statements that have been made here which can give any guidance to the conferees.

If the object of the regulations is not to prevent the discharge of heat into Lake Michigan; if it is not to prevent the diffusion of heat discharging facilities around the shore of the lake; if it is not to protect fish and plankton, then it is confusing as to just what it is that an attempt is being made to accomplish.

One further matter has been ignored. We would not have expected that regulations of this magnitude and having the ramifications that they have would have been presented without full studies of their effects upon the existing points of discharge of heated water into Lake Michigan, and upon the areas that are proposed. We would have thought that the Federal Government in all of its majesty and with all of its resources could have accumulated some valid estimates of what it is that they are proposing to be spent in the way of capital expenditures in order to carry out these restrictions that are imposed or proposed in the regulations.

We would have thought that a proper concern for the power situation and the energy situation in this country would have led to some sort of an assessment of what these proposals would have meant to electric generating capacity throughout the country and in the midwest region, which is interconnected as a source of supply and as a receiver of electric energy with the rest of the United States except for the State of Texas.

Attempts were made, I think, by questions directed to the Federal witnesses, to ascertain information along these lines. The most that was given by Mr. Tichenor yesterday was a recalled statement of his as to what the evidence at the previous Four-State Conference showed with respect to Zion.

We do not have the facilities for collecting the overall results or the effects of these proposals. But we do believe that it would be a great mistake and would be an unfair matter for this Conference to reach any conclusions until it does know what the ramifications of its proposals are in terms of construction costs, additional construction costs to comply with the proposals, unless information is presented as to the down-time that will be required for generating stations to be out of operation while these modifications are taking place. That is with reference to existing stations and also with respect to the question of whether and to what extent the provisions in the regulations -- particularly the monthly maxima that are expressed in part 1 -- may actually require the generating stations be operated on something less than a year-round basis, and that an analysis be made of what that means for the power situation.

Dr. Langum this morning was complimentary -- I don't know that he intended it as a compliment -- but he complimented the Commonwealth Edison Company, among others, on its financial stature, on its high regard and the high prestige with which it is held in the financial circles, which enable it to raise the amounts of money that it needs for its construction and service program.

There is one other area in which the Commonwealth Edison Company is proud of its record, and that is its record — and this is more important than its financial standing — its record of service to its consumers. The public utility, you know, has to stand ready to serve all who call upon it, and we do not get advance notice, nobody sends us a letter or a telegram before a switch is turned on, and the result is we must stand ready to serve, and in the past we have been ready and able to do so.

We have not had duplicated in the middle west the situation that exists in New York and on the East Coast. But I will say that the reserve situation for this company is at a seriously low level, and promises to be so for this summer. That condition may continue for a year or two despite all of the efforts that management can make, and anything that would lead to a turning down or a slowdown or a shutdown of generating facilities could have the most important implications.

As a result of all this, and the importance of it, Mr. Chairman, I am asking, and well I do ask, that the

C. A. Bane

Commonwealth Edison Company be given 2 weeks in which to file a statement with this Conference in which we will reaffirm and reconfirm the cost that we have previously submitted for Zion as to the costs and the ramifications of installing a closed circuit cooling system. We will submit information as to what the proposed regulations will require at Waukegan and the State Line Station, as to both of which the Federal Government simply stated that in their view, without having made any study, all that we would have to do would be to revise some discharge structures, and there was some mention that perhaps in some circumstances -- I don't know if this has particular relation to our company -- as little as the installation of an additional pump would do the job.

Well, we are not satisfied, and I don't think that you gentlemen of the Conference ought to be satisfied with speculation of that kind. And we will propose to give you the facts as to what is required of us, what it will cost, for what period of time, if any, we will have to shut down the stations in order to make the modifications that are called for, and other relevant information.*

I might just say, having mentioned Waukegan, that we are particularly puzzled about the purpose of the

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*Mr. Bane's further statement follows on pp. 499a-499gg.

ISHAM, LINCOLN & BEALE
COUNSELORS AT LAW

ONE FIRST NATIONAL PLAZA FORTY-SECOND FLOOR
CHICAGO, ILLINOIS 60670

TELEPHONE 312-786-7500 CABLE: MAHSI

April 29, 1971

Mr. Murray Stein, Chairman
Four-State Lake Michigan
  Enforcement Conference
c/o Environmental Protection Agency
Water Quality Office
Crystal Mall, Building No. 2
1921 Jefferson Davis Highway
Arlington, Virginia 20242

Dear Mr. Stein:

We have enclosed the statement of Mr. O. D. Butler, Assistant Vice President of Commonwealth Edison Company, dated April 23, 1971, which presents the additional evidence for the record of the conference meeting of March 23-25, 1971, which you granted us time to submit at Mr. Bane's request.

Very truly yours,

Mark H. Virshbo

MHV:hh
Enclosure

cc: All conferees
    Mrs. Marilyn Hall, Stenographic reporter

STATEMENT OF O.D. BUTLER, ASSISTANT VICE PRESIDENT

COMMONWEALTH EDISON COMPANY
April 23, 1971

To the Conference in the Matter of Pollution
of Lake Michigan and its tributary basin in
the states of Wisconsin, Illinois, Indiana
and Michigan--Third Session

Gentlemen:

I have submitted statements to this session of the Conference on three previous occasions. First, at the September 28, 1970, workshop, I presented a preliminary rebuttal of the Federal Water Quality Administration's report, "Feasibility of Alternative Means of Cooling for Thermal Power Plants Near Lake Michigan," which I had received just a few days earlier. My rebuttal was based upon a preliminary report on the environmental effect of cooling towers at our Zion nuclear generating station, prepared by the Sierra Research Corporation, and I demonstrated the inapplicability of many of the generalizations of the FWQA report to that particular plant, which the FWQA subsequently acknowledged to be so.

Second, I submitted a comparison of the cost elements supporting the estimates made in the FWQA report with the cost elements which the engineering firm of Sargent and Lundy estimated for the backfitting of cooling towers at the Zion station to illustrate the vast deficiency of the FWQA estimates with reference to such a project. Third, I corrected some details of this comparison, bearing out my original contention.

The exhibit attached to my third statement evidenced a total estimated cost of $463,882,000 (or $210.85 per kilowatt) to backfit the Zion station with dry mechanical draft cooling towers and $116,855,000 (or $53.12 per kilowatt) to backfit it with wet hybrid mechanical-natural draft cooling towers. My statements, and the testimony of many other witnesses before the Conference, provided ample reasons in addition to cost why such alternatives to once-through cooling should not be required to be backfitted onto existing plants and those in advanced stages of construction.

Although Commonwealth Edison Company has presented comprehensive and detailed evidence before this Conference, we have not previously submitted cost estimates for backfitting our other two existing, fossil-fuel, plants which use Lake Michigan for once-through cooling--the State Line Station and the Waukegan Station. Until the federal conferee presented his proposed regulations on March 23, 1971, there was no hint that the cooling systems of those two plants might be considered inadequate. The thermal limit and the monthly maximum temperatures proposed by the federal conferee have raised that prospect, and the Conference's adoption of that proposal as its recommendation without regard to evidence of the cost of achieving the standard requires my further testimony on that subject to put the record in order. Mr. Charles A. Bane, our counsel, requested of the Chairman of the Conference the right to make this submission after the federal conferee's proposal had been made and asked that the Conference postpone a recommendation until it had considered this evidence. The Chairman granted us time in which to put our evidence into the record but refused to await the evidence before calling for a recommendation from the conferees. Mr. Bane protested that ruling then, and we protest it now, as highly irregular, capricious and prejudicial, and we tender this evidence now without prejudice to our protest.

The Waukegan Generating Station, located at Waukegan, Illinois, is a fossil-fuel station with an operating history of more than 40 years. It has a generating capacity of 1047 megawatts and uses 875,000 gallons per minute of condenser cooling water under full load. The State Line Generating Station, located in Hammond, Indiana, is a fossil-fuel station with an operating history of more than 40 years. It has a generating capacity of 944 megawatts and uses 830,000 gallons per second of condenser cooling water under full load.

Mr. Dale S. Bryson, a principal federal witness, acknowledged that the thermal standards proposed for these existing generating stations would likely require alteration of their discharge and pumping apparatus (S.M. 140), but implied that this would be a nominal expense (S.M. 155). We have obtained from the engineering firm of Sargent and Lundy detailed estimates of what could be required and the costs to our Waukegan and State Line stations. It is clear from those figures that Mr. Bryson's implication was unfounded. Exhibit A, attached hereto, demonstrates that the total cost involved in altering discharge and pumping apparatus at the Waukegan Station would be in excess of $9 million and at the State Line Station would be in excess of $11.5 million. Exhibit B illustrates the form which the altered discharge system would take at each station.

Mr. Bryson did not point out that, in view of the monthly maximum temperatures of the recommended standard, these existing plants might well be barred from discharging into the lake at all. Dr. Donald I. Mount, another principal federal witness, had implied as much (S.M. 121). In that event, in order to keep them on the line to supply essential power in the critical summer period, it would be necessary to backfit these plants with cooling towers. Sargent and Lundy have provided us with detailed estimates of the cost of backfitting natural draft wet cooling towers and mechanical draft wet cooling towers for each station, and also with an estimate of the cost of using Wolf Lake for once-through cooling of the State Line Station if that should prove feasible and permissible. The cost of dry cooling towers would, of course, be considerably greater.

Exhibit C demonstrates that the initial capital investment alone, without allowance for escalation, at Waukegan would be in excess of $16 million for a natural draft cooling tower and in excess of $12 million for mechanical draft cooling towers. Exhibit D demonstrates that the initial capital investment alone, without allowance for escalation, at State Line would be in excess of $33 million for the natural draft cooling towers, in excess of $23 million for mechanical draft cooling towers, and in excess of $46 million using Wolf Lake for once-through cooling. Line 49 of Exhibit E demonstrates that the total of initial capital investment, plus equivalent capital investment (detailed in Exhibit E), again without allowance for escalation, would be in excess of $25 million for natural draft towers and in excess of $19 million for mechanical draft towers at Waukegan; and in excess of $45 million for natural draft towers, in excess of $33 million for mechanical draft towers and in excess of $59 million to use Wolf Lake for once-through cooling at State Line. Exhibit F represents Sargent and Lundy's estimate of the time required to backfit each of these alternative systems. Page 3 of Exhibit F contains their time estimate and estimate of station outage for backfitting cooling towers at our Zion station which we present here to supplement the record with regard to that station.

I think that, had the conferees taken this evidence into account before making their recommendation, as they properly should have, their recommendation would have been different. Studies of existing stations on Lake Michigan have not shown any ecological damage as a result of many years of operation. We submit that, though the Conference failed to do so, the Administrtor must weigh the economic and environmental costs of cooling alternatives for existing plants and those in an advanced stage of construction against the at best marginal environmental advantage provided by the arbitrary standards recommended by the conferees. I emphasize that my testimony relates the effect of the conferees' recommendation on Commonwealth Edison Company only and does not account for the substantial additional costs which would be borne by the other affected companies. The grand total of all such costs would render the position which I have stated here that much more imperative.

Sargent & Lundy, Engineers
Chicago

Mechanical Analytical Division
S. L.
4-2-71
Page 1 of 2
Rev. 4-14-71

499h

WAUKEGAN AND STATE LINE STATIONS
COMMONWEALTH EDISON COMPANY

PROPOSED CIRCULATING WATER INSTALLATION FOR HIGH VELOCITY UNDERWATER DISCHARGE

Station		Waukegan	State Line
Unit Numbers		5, 6, 7, & 8	1, 2, 3, & 4
1. Total Circulating Water Quantity	Gpm	720,000	946,000
2. New Circulating Water Discharge Piping:			
(a) Pipe Diameter	Ft.	14	16
(b) Length of Pipe Run into Lake	Ft.	1,200	1,000
3. Velocity in Discharge Pipe	Ft/Sec	10.4	10.5
4. Number of New Circulating Water Discharge Pumps Installed		3	4
5. Total Head on Discharge Pumps	Ft.	8.0	7.5
6. Pumping Power Required	HP	1,720	2,100
7. Additional Auxiliary Power Required	Kw	1,378	1,683
CAPABILITY			
8. Evaluation of Loss in Sent-Out Capability Due to Discharge Pump Power, at $100/Kw (Item 7 x $100)	$	137,800	168,300
FUEL COST DUE TO AUXILIARY POWER			
9. Equivalent Investment Value of Fuel for 1 Kw of Auxiliary Power (Data from Commonwealth Edison Co.)	$	77.22	71.11
10. Incremental Equivalent Capital Investment due to Discharge Pump Power Required (Item 7 x Item 9)	$	106,400	119,700
MAINTENANCE			
11. Annual Cost of Maintenance (Item 4 x $1000/Pump/Yr)	$/Yr	3,000	4,000
12. Present Value of Maintenance Cost for 20 Years (Item 11 x $10; See Note Below)	$	30,000	40,000

Sargent & Lundy, Engineers
Chicago

Mechanical Analytical Division
S. L.
4-2-71
Page 2 of 2

Station		Waukegan	State Line
MAINTENANCE (CONT'D)			4991
13. Incremental Equivalent Capital Investment due to Maintenance (Item 12 ÷ (1.28 x 1.15); (See Note Below)	$	20,400	27,200

NOTE:
- (a) The Present Value of an Annuity of $1.00 for 20 Years is $10.00;
- (b) The Present Value of Carrying Charges on an Investment of $1.00 for 20 Years is $1.28;
- (c) Use 15% Indirects;
- (d) Then Equivalent Capital Investment $= \frac{\text{P.V. of Annuity for 20 Years}}{1.28 \times 1.15}$

SUMMARY

Station		Waukegan	State Line
14. Equivalent Capital Investment due to Capability Loss	$	137,800	168,300
15. Equivalent Capital Investment due to Annual Auxiliary Power Costs	$	106,400	119,700
16. Equivalent Capital Investment due to Annual Maintenance Costs	$	20,400	27,200
17. Capital Investment for Piping, Pumps, Motors, Including Installation and Top Charges	$	8,986,000	11,293,000
18. Total of Equivalent Capital Investment and Initial Capital Investment Required to Purchase, Install, and Operate the Proposed New Circulating Water Discharge System	$	9,250,600	11,608,200

SARGENT & LUNDY
ENGINEERS
CHICAGO

Est. No. 6606
Project No.
Date:

L.W.

WAUKEGAN POWER STATION
COMMONWEALTH EDISON COMPANY

Estimated Cost

Proposed Installation of a New Pumping Station to Take the Present Circulating Water Discharge and Pumping it into Lake Michigan to a Distance of Approx. 1200'.

(Prices are Present Day and a 40 Hour Work Week)

Item	Item Description	Amount
1.	New Pump House Complete with Appurtenances	$1,800,000
2.	Alterations of Discharge Flume	100,000
3.	Control Valves, Etc.	250,000
4.	Circulating Water Pumps	
	a. Three(3) 240,000 gal/m Pumps and Motor Drives	690,000
	b. Erection	75,000
5.	Electrical Connection, Lighting, Heating, Etc.	275,000
6.	Road to Pumping Station	10,000
7.	14' Diameter Steel Pipe - Installed @ $1300/ft	
	a. Safe Harbor	1,500,000
	b. 1200' of 14' Pipe - Layed in Lake Michigan	1,560,000
	c. Discharge Structure at the End of the Pipe Layed in Lake Michigan	1,000,000
	SUB-TOTAL 7	$4,060,000
8.	Contingency 10%	726,000
	TOTAL ESTIMATED CONSTRUCTION COST	$7,986,000
9.	Top Charges 12½%	1,000,000
	TOTAL ESTIMATED COST	$8,986,000

Final

SARGENT & LUNDY
ENGINEERS
CHICAGO

499k

Est. No. 6605
Project No.
Date:

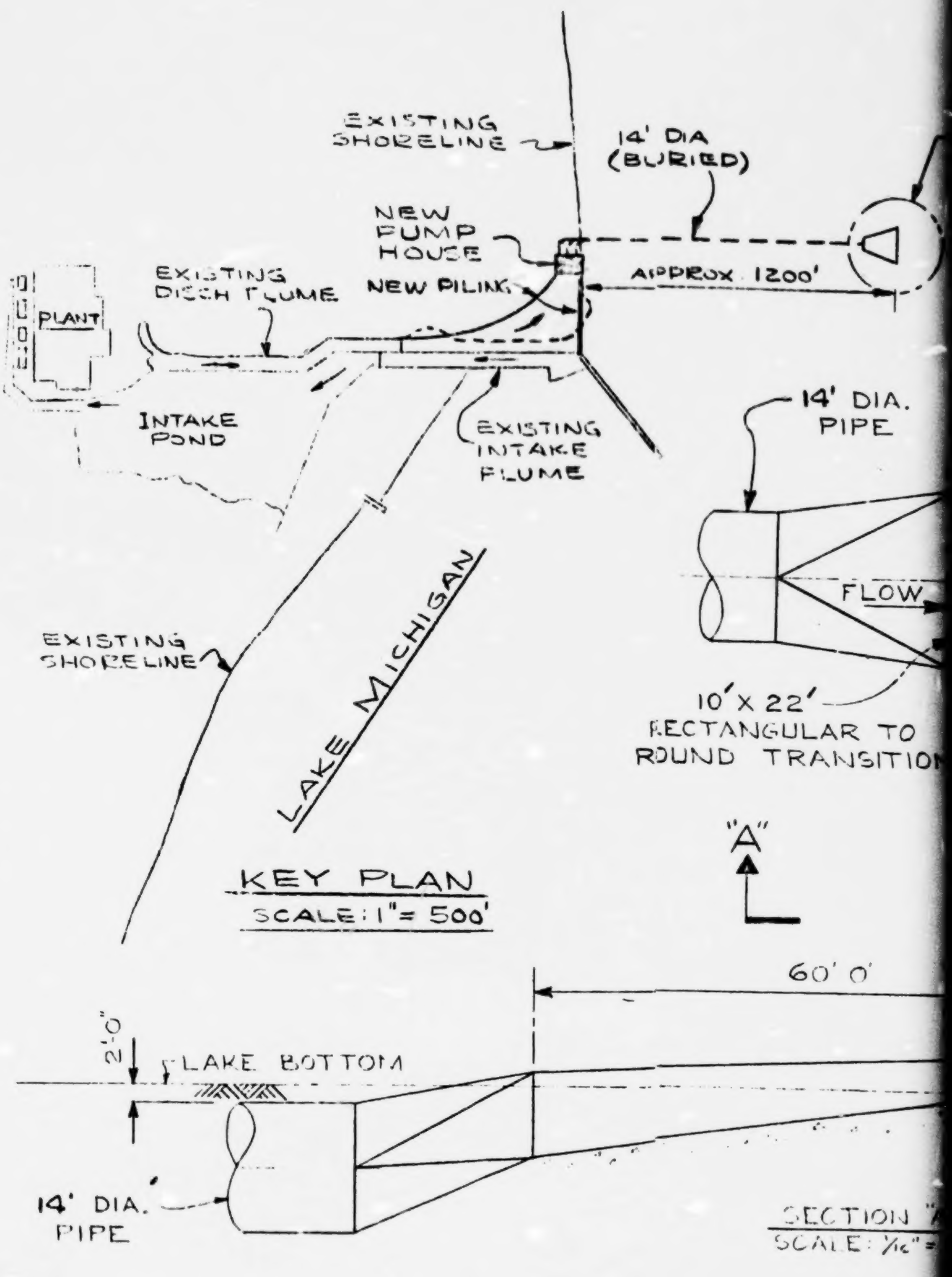
STATE LINE STATION
COMMONWEALTH EDISON COMPANY

Estimated Cost

L.W./

Proposed Installation of a New Pumping Station to Take the Present Circulating Water Discharge and Pumping it into Lake Michigan to a Distance of Approx. 1000'.

Item	Item Description	Amount
1.	New Pump House Complete with Appurtenances	$3,000,000
2.	Alterations of Present Break Water and Discharge Flume	350,000
3.	Control Valves, Etc.	300,000
4.	Circulating Water Pumps	
	a. Four(4) 237,000 gal/m Pumps and Motor Drives	920,000
	b. Erection	100,000
5.	Electrical Connections, Lighting, Heating, Etc.	350,000
6.	Roadway to Pumping Station	10,000
7.	16' Diameter Steel Pipe Installed	
	a. Safe Harbor	1,500,000
	b. 1000' of 16' Dia. Steel Pipe Layed in Lake Michigan	1,500,000
	c. Discharge Structure at End of Pipe Layed in Lake Michigan	1,100,000
	SUB-TOTAL 7	$4,100,000
8.	Contingency 10%	913,000
	TOTAL ESTIMATED CONSTRUCTION COST	$10,043,000
9.	Top Charges 12½%	1,250,000
	TOTAL ESTIMATED COST	$11,293,000


EXISTING SHORELINE
14' DIA (BURIED)
NEW PUMP HOUSE
NEW PILING
APPROX 1200'
EXISTING DITCH FLUME
PLANT
INTAKE POND
EXISTING INTAKE FLUME
EXISTING SHORELINE
LAKE MICHIGAN
14' DIA. PIPE
FLOW
10'x 22' RECTANGULAR TO ROUND TRANSITION
"A"
60' 0'
2'-0"
LAKE BOTTOM
14' DIA. PIPE

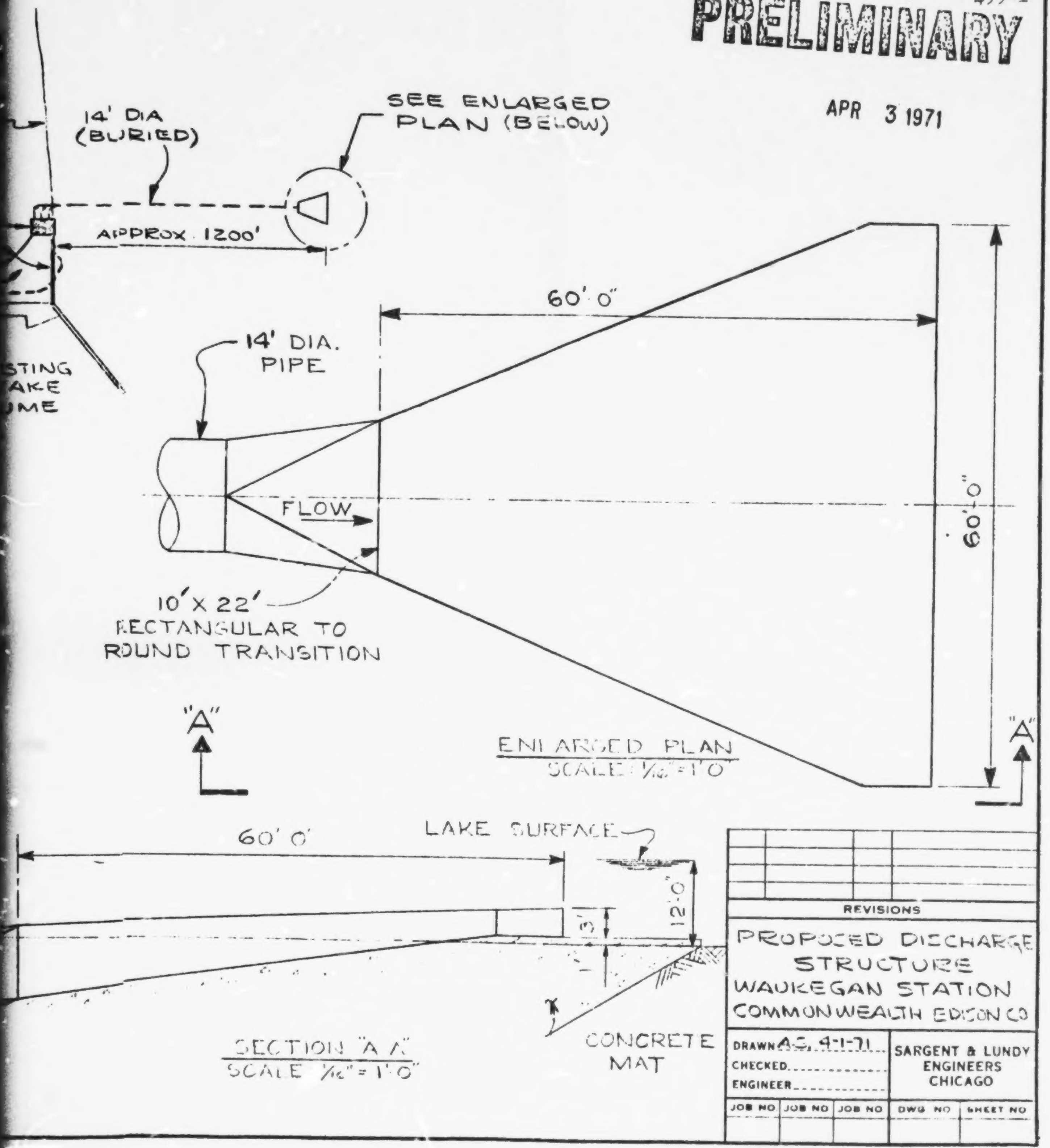
KEY PLAN
SCALE: 1" = 500'

SECTION "A
SCALE: ⅟₁₆" =

p.1 of 2
499-1

PRELIMINARY

APR 3 1971



14' DIA
(BURIED)
SEE ENLARGED
PLAN (BELOW)
APPROX. 1200'
STING
AKE
UME
60' 0"
14' DIA.
PIPE
FLOW
60'-0"
10' X 22'
RECTANGULAR TO
ROUND TRANSITION
"A"
"A"
ENLARGED PLAN
SCALE: 1/16"=1'-0"
60' 0"
LAKE SURFACE
12'-0"
3'
1'
SECTION "A-A"
SCALE 1/16"=1'-0"
CONCRETE
MAT

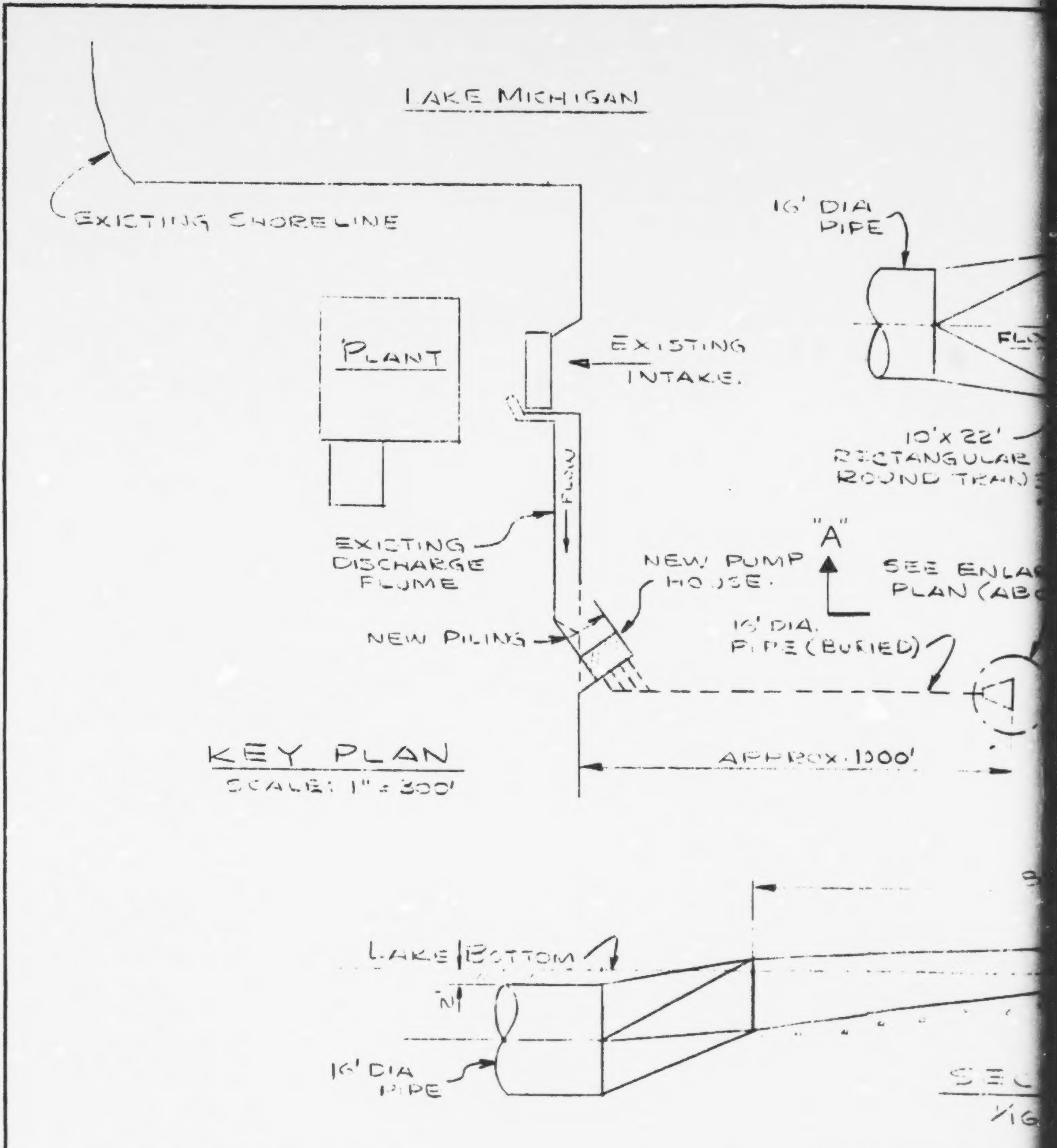
REVISIONS

PROPOSED DISCHARGE
STRUCTURE
WAUKEGAN STATION
COMMONWEALTH EDISON CO

DRAWN A.S. 4-1-71
CHECKED
ENGINEER

SARGENT & LUNDY
ENGINEERS
CHICAGO

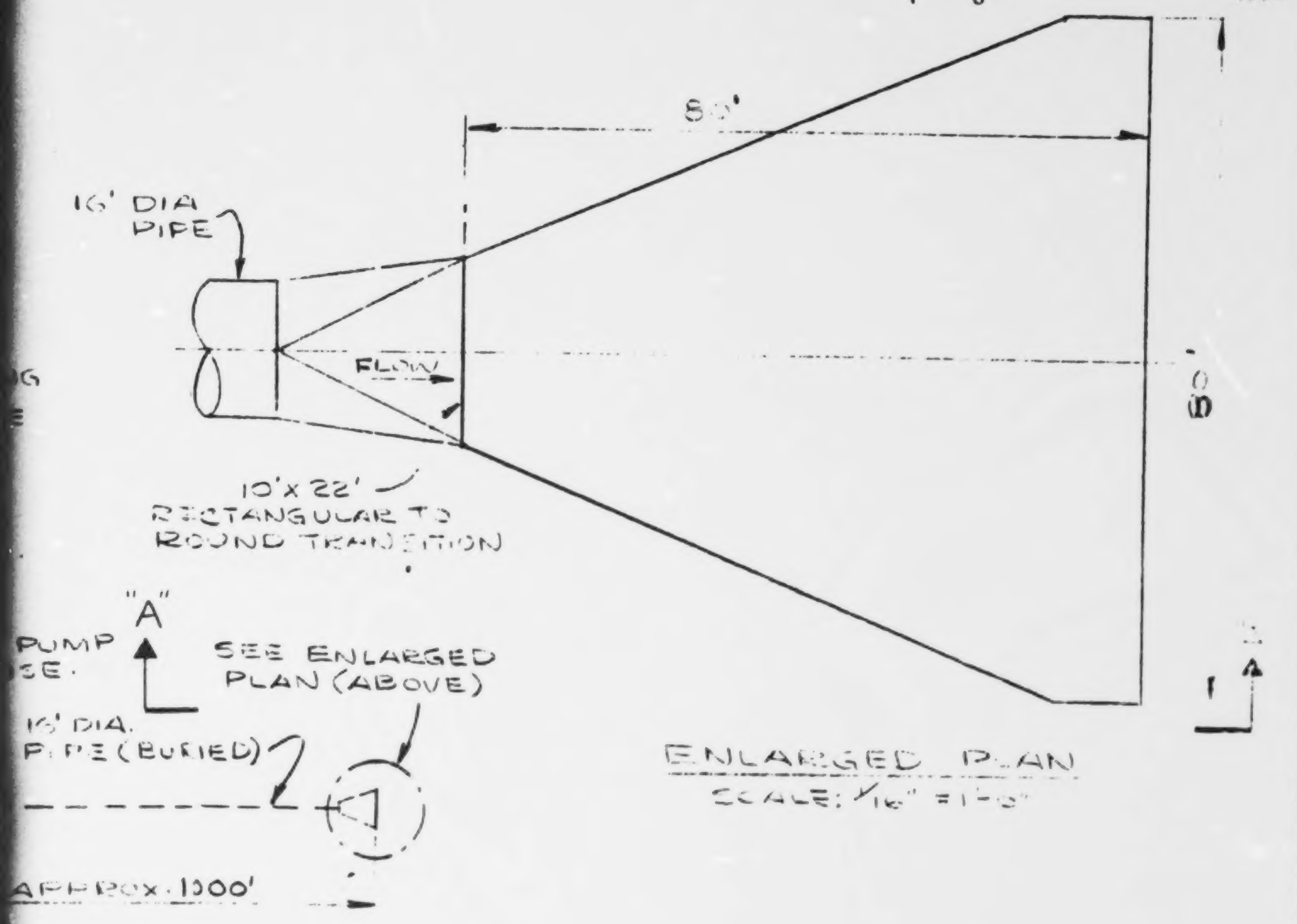
JOB NO	JOB NO	JOB NO	DWG NO	SHEET NO


LAKE MICHIGAN
EXISTING SHORELINE
16' DIA
PIPE
PLANT
EXISTING
INTAKE.
10'x 22'
RECTANGULAR
ROUND TRAN
FLO
FLOW
EXISTING
DISCHARGE
FLUME
"A"
NEW PUMP
HOUSE.
SEE ENLA
PLAN (AB
NEW PILING
16' DIA.
PIPE (BURIED)
APPROX. 1300'
LAKE BOTTOM
N
16' DIA
PIPE
SE
1/16

KEY PLAN
SCALE: 1" = 300'

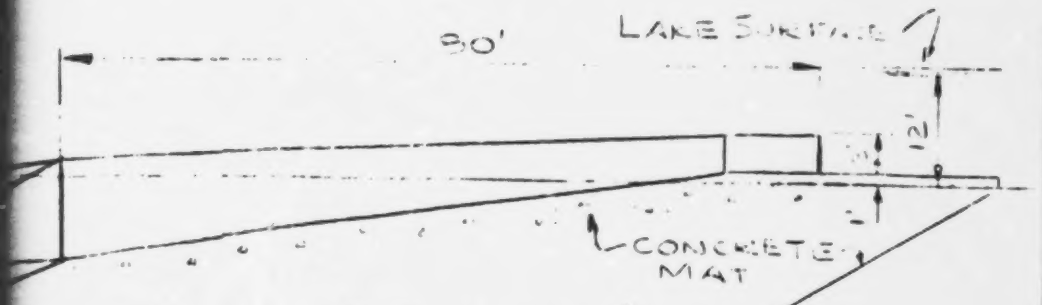
p. 2 of 2

499m


80'
16' DIA PIPE
FLOW
10'x 22' RECTANGULAR TO ROUND TRANSITION
"A"
PUMP
SEE ENLARGED PLAN (ABOVE)
16' DIA. PIPE (BURIED)
APPROX. 1300'
A

ENLARGED PLAN

SCALE: 1/16" = 1'-0"


80'
LAKE SURFACE
12'
CONCRETE MAT

SECTION "A-A"

1/16" = 1'-0"

REVISIONS

PROPOSED D
STRUCT
STATELINE STA
COMMONWEALTH EDI

DRAWN A C 4.1.71
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ENGINEER

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ENGINEER
CHICAGO

JOB NO	JOB NO	JOB NO	DWG NO	SHEE

SARGENT & LUNDY
ENGINEERS
CHICAGO

Est. No. 6365-1
Project No.
Date: 5-12-70
Rev: 4-2-71

WAUKEGAN POWER STATION
COMMONWEALTH EDISON COMPANY

Revised Cost Estimate

NT/RL/DB/DR/

Proposed Installation of Cooling Water Facilities
for Units 5,6,7, & 8

Scheme 1: One(1) Natural Draft Cooling Tower Total Capacity 720,000 gal/m Located on Land Fill at Stations Present Intake Pond.

Scheme 2: Three(3) Mechanical Draft Cooling Towers Total Capacity 720,000 gal/m Located on Land Fill at Stations Present Intake Pond and Land East of Intake Pond.

(Prices are Present Day and Based on a 40 Hr. Work Week)

	Scheme 1	Scheme 2
I - Estimated Construction Cost of Present Estimate #6365 Dated 5-12-70	$13,180,000	$9,600,000
II - Additional 5% Contingency	624,000	458,000
TOTAL I Plus II	$13,804,000	$10,058,000
III - Escalation from 5-12-70 to 4-2-71 - Plus 8%	1,104,000	805,000
TOTAL	$14,908,000	$10,863,000
IV - Top Charges 12.5%	1,860,000	1,358,000
TOTAL ESTIMATED COST - (Present Day Prices & a 40 Hour Work Week)	$16,768,000	$12,221,000
V - Escalation Allowance - Plus 16% (Note 1)	2,680,000	1,953,000
TOTAL ESTIMATED COST	$19,448,000	$14,174,000

NOTES:

1. Allowance for Escalation
   a. Construction Period - Assume Completion by 10-1-73.
   b. Time Period - Today to 10-1-73 is Approx. 30 Months.
   c. Assume Median Point for Escalation of 2 Years.
   d. Rate Increase Per Year: Assume Labor Rate Increase in Cost of 15% and Equipment and Materials at 4%. A Composite Average on this Basis is about 8%.
   e. Allowance for Escalation is therefore 16%.
2. No Allowance is Made for an Overtime Work Schedule.

499-0

SARGENT & LUNDY
ENGINEERS
CHICAGO

Est. No. 6365
Project No. 4170
Date: 5-12-70

NT/RL/DB/DR/

WAUKEGAN POWER STATION
COMMONWEALTH EDISON COMPANY

PROPOSED INSTALLATION OF COOLING WATER FACILITIES
For Units 5, 6, 7, & 8

SCHEME 1: One (1) Natural Draft Cooling Tower Total Capacity 720,000 G.P.M. Located On Land Fill At Stations Present Intake Pond.

SCHEME 2: Three (3) Mechanical Draft Cooling Towers Total Capacity 720,000 G.P.M. Located On Land Fill At Stations Present Intake Pond And Land East Of Intake Pond.

Prices Are Present Day And Based On A 40 Hour Work Week.

	SCHEME 1	SCHEME 2
L. LAND		
1. Land Acquisition	Not Req'd.	Not Req'd.
S. STRUCTURES		
1. Ground Improvements		
a. Fill and Grading	$5,000	$10,000
b. Roads	5,000	10,000
c. Yard Drainage System	10,000	15,000
d. Sewer Drainage System)	—	—
e. Tracks)		
f. Fence)		
g. Seeding	1,000	3,000
h. Roadway Bridge Over Existing Intake Flume To Pump House	100,000	100,000
i. Underground Interference	-	10,000
Total 1	121,000	148,000
2. New Fill Area		
a. Cofferdam For New Fill Area	600,000	600,000
b. Earth Fill)	800,000	800,000
c. Rip Rap Slopes)		
Total 2	1,400,000	1,400,000
3. Pump House	925,000	925,000
4. Cooling Tower Bearing Piles and Pile Caps Incl. Pipe Riser Foundations	350,000	-
5. Cooling Tower Basins	-	675,000

Est. No. 6365
Project No. 4170
Date: 5-12-70

WAUKEGAN POWER STATION
COMMONWEALTH EDISON COMPANY

	SCHEME 1	SCHEME 2
6. Alteration To Existing Intake And Discharge Flumes Incl. Closing Off Entrance And Outlet Of Flumes	$ 100,000	$ 100,000
7. Discharge Outfall Structure	75,000	75,000
8. Circulating Water Pipe Support Over Intake Flume	Incl. S1-h	Incl. S1-h
9. Earth Work For Circulating Water Pipes And Make Up Line	100,000	175,000
Total Structures	3,071,000	3,498,000
M. MECHANICAL		
1. One (1) Natural Draft Cooling Tower Furnished, Delivered and Erected	7,000,000	-
2. Three (3) Mechanical Draft Cooling Towers Furnished, Delivered and Erected	-	2,400,000
3. Circulating Water Piping For Cooling Towers a. From New Pump House To Towers) b. From Towers To Intake Pond)	675,000	1,100,000
4. Cooling Tower Circulating Water Pumps And Motor Drives	1,200,000	1,200,000
5. Service Water Modifications	200,000	200,000
6. Circulating Water Make Up Piping	50,000	50,000
7. Miscellaneous Instruments and Controls	5,000	5,000
8. Painting	10,000	10,000
Total Mechanical	$ 9,140,000	$ 4,965,000
E. ELECTRICAL		
1. 138 kV Oil Circuit Breaker and Appurtenances	Existing	Existing
2. 138 kV Feed To 4160V Substation (Aerial)	13,000	13,000

Est. No. 6365
Project No. 4170
Date: 5-12-70

499q

WAUKEGAN POWER STATION
COMMONWEALTH EDISON COMPANY

	SCHEME 1	SCHEME 2
3. 4160V Substation	180,000	205,500
4. 480V Substations	31,000	170,000
5. 480V Motor Control Centers	3,500	7,000
6. Control and Instrumentation	8,000	10,000
7. Power Cables and Terminations	16,000	30,000
8. Control and Instrument Cables and Terminations	16,000	25,000
9. Conduit and Duct Runs	23,000	102,500
10. Lighting	19,500	41,500
11. Grounding	7,500	25,500
12. Testing	9,000	15,000
13. Temporary Light and Power	11,000	20,000
14. Contingency	7,500	14,000
Total Electrical	345,000	679,000
Miscellaneous and Contingency - 5%	624,000	458,000
Total Estimated Construction Cost	$13,180,000	$9,600,000
Top Charges	Not Incld.	Not Incld.
Total Estimated Cost	$13,180,000	$9,600,000

NOTE:
1. Allowance For Future Escalation Of Equipment, Material and Labor Is Not Included.
2. Allowance For Increase Labor Costs Over 40 Hour Work Week Are Not Included.
3. Necessary Earth Fill Is Assumed To Be Purchased From A Local Source And Constructed With Mobile Land Equipment.

SARGENT & LUNDY
ENGINEERS
CHICAGO

Est. No. 6364-1
Project No.
Date: 5-12-70
Rev: 4-2-71

STATE LINE STATION
COMMONWEALTH EDISON COMPANY

Revised Cost Estimate

RL/NT/DB/DR/L.W.

Proposed Schemes for Installing Cooling Water Facilities.

Scheme No. 1: Two(2) Natural Draft Cooling Towers, Total Capacity 946,000 gal/m. Located on Land Fill in Lake Michigan. Adjacent to Present Discharge Flume.

Scheme No. 2: Cooling Water Facilities Using Wolf Lake.

Scheme No. 3: Four(4) Mechanical Draft Cooling Towers, Total Capacity 946,000 gal/m. Located on Land Fill in Lake Michigan. Adjacent to Present Discharge Flume.

(Prices are Present Day and Based on a 40 Hour Work Week)

	Scheme #1	Scheme #2	Scheme #3
I - Estimated Construction Cost of Present Estimate #6364 Dated 5-12-70	$26,200,000	$36,800,000	$18,275,000
II - Additional 5% Contingency	1,228,000	1,766,000	871,000
TOTAL I Plus II	$27,428,000	$38,566,000	$19,146,000
III - Escalation from 5-12-70 to 4-2-71 - Plus 8%	2,194,000	3,085,000	1,532,000
IV - Top Charges - 12.5%	3,705,000	5,210,000	2,580,000
TOTAL ESTIMATED COST (Present Day Prices & a 40 Hour Work Week)	$33,327,000	$46,861,000	$23,258,000
V - Escalation Allowance - Plus 16%	5,330,000	7,500,000	3,725,000
TOTAL ESTIMATED COST	$38,657,000	$54,361,000	$26,983,000

Est. No. 6364-1
Project No.
Date: 5-12-70
Rev: 4-2-71

STATE LINE STATION
COMMONWEALTH EDISON COMPANY

NOTES:

1. Allowance for Escalation
   a. Construction Period - Assume Completion by 10-1-73.
   b. Time Period - Today to 10-1-73 is Approx. 30 Months.
   c. Assume Median Point for Escalation of 2 Years.
   d. Rate Increase Per Year: Assume Labor Rate Increase in Cost of 15% and Equipment and Materials at 4%. A Composite Average on this Basis is about 8%.
   e. Allowance for Escalation is therefore 16%.
2. No Allowance is Made for an Overtime Work Schedule.

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Est. No. 6364
Project No. 4170
Date: 5-12-70

RL/NT/DB/DR/ LW

STATE LINE STATION
COMMONWEALTH EDISON COMPANY

PROPOSED INSTALLATION OF COOLING WATER FACILITIES

Scheme No. 1: Two (2) Natural Draft Cooling Towers, Total Capacity 946,000 GPM. Located on Land Fill in Lake Michigan. Adjacent to Present Discharge Flume.

Scheme No. 2: Cooling Water Facilities Using Wolf Lake.

Scheme No. 3: Four (4) Mechanical Draft Cooling Towers, Total Capacity 946,000 GPM. Located on Land Fill in Lake Michigan. Adjacent to Present Discharge Flume.

(Prices Are Present Day and Based on a 40 Hour Work Week)

		Scheme No. 1	Scheme No. 2	Scheme No. 3
L	LAND			
	1. Land Acquisition	Not Incl.	Not Incl.	Not Incl.
	2. Piping and Electrical Right of Way	-	Not Incl.	-
S	STRUCTURES			
	1. Ground Improvements			
	A. Off Site			
	a. Fill and Grading	-	$ 5,000	-
	b. Access Roads to Structures	$ 25,000	150,000	$ 25,000
	c. Bridges			
	1. Across Present Flume	200,000	-	200,000
	2. Roadway Bridge at Wolf Lake	-	300,000	-
	3. Track Bridge at Wolf Lake	-	500,000	-
	d. Yard Drainage System	10,000	25,000	10,000
	e. Sewer Drainage System	-	25,000	-

STATE LINE STATION
COMMONWEALTH EDISON COMPANY

	Scheme No. 1	Scheme No. 2	Scheme No. 3
S STRUCTURES (Cont'd)			
1. Ground Improvements (Cont'd)			
A. Off Site (Cont'd)			
f. Toilet Facilities for Crib House at Wolf Lake	-	$ 15,000	-
g. Fence	$ 25,000	10,000	$ 25,000
h. Seeding	-	5,000	-
TOTAL A	$ 260,000	$ 1,035,000	$ 260,000
B. On Site			
a. Fill and Grading	-	$ 3,000	-
b. Road Alteration and Maintenance	$ 5,000	25,000	$ 5,000
c. Yard Drainage System	-	5,000	-
d. Sewer Drainage System	-	-	-
e. Track Work	-	50,000	-
f. Underground Interferences	-	50,000	-
TOTAL B	$ 5,000	$ 133,000	$ 5,000
TOTAL 1	$ 265,000	$ 1,168,000	$ 265,000
2. Lake Work			
A. Cofferdam for New Fill Area			
a. Sheeting & Steel Wale Bracing) b. Gravel Fill) c. Capping Sheeting Cellular Cofferdam)	$ 4,800,000	-	$ 5,050,000
B. Fill for New Cooling Tower Area	1,700,000	-	1,750,000
C. Dredging Lake	-	$ 100,000	-
TOTAL 2	$ 6,500,000	$ 100,000	$ 6,800,000

Est. No. 6364
Project No. 4170
Date: 5-12-70

STATE LINE STATION
COMMONWEALTH EDISON COMPANY

STRUCTURES (Cont'd)	Scheme No. 1	Scheme No. 2	Scheme No. 3
3. Pump House			
A. Cooling Tower Pump House	$ 925,000	-	$ 925,000
B. Booster Pump House for Circ. Water Pipes to Wolf Lake	-	$ 925,000	-
C. New Intake Crib House at Wolf Lake	-	1,125,000	-
TOTAL 3	$ 925,000	$ 2,050,000	$ 925,000
4. Cooling Towers Bearing Piling and Pile Caps Incl. Pipe Riser Foundations	$ 1,300,000	-	-
5. Cooling Tower Basins	-	-	$ 875,000
6. Alteration to Existing Intake and Discharge Flumes			
A. Pipe Openings for Intake and Discharge Pipes	Incl. S-2	$ 150,000	Incl. S-2
B. Close Off Existing Intake and Discharge Flume Entrance or Outlet	Incl. S-2	200,000	Incl. S-2
TOTAL 6	Incl. S-2	$ 350,000	Incl. S-2
7. Discharge Spillway and Ice Melting By Pass Valve Vault Structure	-	$ 100,000	-
8. Earth Work for Circulating Water Pipes and Ice Melting Pipe			
A. Tunneling Below Existing Railroad Tracks Off Site	-	3,800,000	-
B. Temporary Sheeting, Excavation, Backfill, Disposal and Dewatering Including Interferences	$ 300,000	12,000,000	$ 250,000
TOTAL 8	$ 300,000	$15,800,000	$ 250,000
TOTAL STRUCTURES	$ 9,290,000	$19,568,000	$ 9,115,000

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Est. No. 6364
Project No. 4170
Date: 5-12-70

STATE LINE STATION
COMMONWEALTH EDISON COMPANY

		Scheme No. 1	Scheme No. 2	Scheme No. 3
M	MECHANICAL			
	1. Natural Draft Cooling Towers Furnished Delivered and Erected	$11,000,000	-	$ 3,200,000
	2. Cooling Tower Circulating Water Pumps and Motor Drives	1,500,000	-	1,500,000
	3. Circulating Water Piping for Cooling Towers			
	A. From New Pump House to Towers B. From Towers to Existing Crib House Forebay	2,500,000	-	2,500,000
	4. Circulating Water Pumps and Motor Drives			
	A. Pumps and Motor Drives at Wolf Lake Pump House (6) B. Pumps and Motor Drives at Existing Circulating Water Discharge Flume (6)	-	$ 2,250,000	-
	5. Circulating Water Pipe			
	A. From Existing Discharge Flume to Wolf Lake B. From Pump House at Wolf Lake to Existing Crib House Forebay C. Ice Melting	-	12,000,000	-
	6. Service Water Modifications	200,000	200,000	200,000
	7. Traveling Screens (8) at Wolf Lake Pump House	-	130,000	-
	8. Two (2) Screen Wash Pumps and Motor Drives	-	3,000	-
	9. One (1) Twin Basket Strainer for Screen Wash Water	-	2,000	-
	10. Miscellaneous Instruments and Controls	5,000	10,000	7,000

STATE LINE STATION
COMMONWEALTH EDISON COMPANY

		Scheme No. 1	Scheme No. 2	Scheme No. 3
M	MECHANICAL (Cont'd)			
	11. Circulating Water Make-Up Gate	$ 10,000	-	$ 10,000
	12. Painting	10,000	$ 20,000	10,000
	TOTAL MECHANICAL	$15,225,000	$14,615,000	$ 7,427,000
E	ELECTRICAL			
	1. 138 kV Oil Circuit Breaker and Appurtenances	$ 72,000	$ 72,000	$ 72,000
	2. 138 kV Feed to 4160 V Substations (Aerial)	13,000	65,000	13,000
	3. 4160 V Substations	204,000	394,000	205,500
	4. 480 V Substations	31,000	64,000	226,000
	5. 480 V Motor Control Centers	4,000	7,000	7,000
	6. Control and Instrumentation	8,000	10,000	11,500
	7. Power Cables and Terminations	18,000	17,000	35,000
	8. Control and Instrument Cables and Terminations	16,000	116,000	29,000
	9. Conduit and Duct Runs	18,000	30,000	115,000
	10. Lighting	26,000	20,000	55,000
	11. Grounding	12,000	9,000	34,500
	12. Testing	10,000	15,000	18,000
	13. Temporary Light and Power	15,000	15,000	24,000
	14. Contingency	10,000	17,000	16,500
	TOTAL E - ELECTRICAL	$ 457,000	$ 851,000	$ 862,000

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Est. No. 6364
Project No. 4170
Date: 5-12-70

STATE LINE STATION
COMMONWEALTH EDISON COMPANY

	Scheme No. 1	Scheme No. 2	Scheme No. 3
Miscellaneous & Contingency - 5%	$ 1,228,000	$ 1,766,000	$ 871,000
Total Estimated Construction Cost	26,200,000	36,800,000	18,275,000
Top Charges	Not Incl.	Not Incl.	Not Incl.
TOTAL ESTIMATED COST	$26,200,000	$36,800,000	$18,275,000

NOTES:

1. Allowance for future escalation of equipment, material and labor is not included.
2. Allowance for increased labor costs over 40 hour work week are not included.
3. Necessary earth fill for new cofferdam area in Lake Michigan is assumed to be had from Burns Harbor Ditch location and the construction being completed with use of lake barges, scows, etc.

Sargent & Lundy, Engineers
Chicago, Illinois

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Page 1 of 5
Rev. 4-1-71

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STUDY OF CIRCULATING WATER COOLING FACILITIES

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Station		[illegible]			STATE LINE UNITS 1, 2, 3 & 4			
Scheme		1	2	3	1	2	3	4
Description		Lake Only	Mechanical Draft Wet Cooling Tower	Natural Draft Wet Cooling Tower	Lake Only	Wolf Lake for Cooling	Mechanical	Natural Draft Wet Cooling Tower
Number of Cooling Towers		-	Three	One			Four	Two
Dimensions of Each Tower (D = Diameter, H = Height, L = Length, W = Width)	Ft.		420L x 70W x 55H	500D x 500H			420L x 70W x 55H	450D x 450H
Total Circulating Water Flow to Towers	Gpm		568,000 (720,000)*	586,000 (720,000)*			946,000	946,000
(*Pump Capacity Will Include Unit #5, Which is Scheduled to Retire in 1975. The Following Performance Data Does Not Include Unit 5)								
Number of Fan Cells for Each Tower		-	10	-	-	-	10	-
Number of Fans per Cell		-	One	-	-	-	One	-
Dimensions of Each Cell			40L x 70W x 55H				40L x 70W x 55H	
CAPABILITY								
1. Ambient Air Temperature for Design: Dry Bulb	°F	95	95	95	95	95	95	95
Wet Bulb	°F	75	75	75	75	75	75	75
2. Cooling Tower Design Approach to Wet Bulb	°F	-	12	18	-	-	12	18
3. Lake Temperature Used for Design	°F	65	65	65	65	65	65	65
4. Temperature of Circulating Water to Condenser	°F	65	87	91	65	93	87	93
5. Rise Across Condenser (Average for All Units)	°F	13	13	13	10	10	10	10
6. Temperature of Circulating Water Leaving Condenser	°F	78	100	103	75	103	97	103

COMMONWEALTH EDISON COMPANY
WAUKEGAN AND STATE LINE STATIONS

STUDY OF CIRCULATING WATER COOLING FACILITIES, Con'd.

Station		WAUKEGAN UNITS 6, 7 & 8			STATE LINE UNITS 1, 2, 3 & 4			
Scheme		1	2	3	1	2	3	4
Description		Lake Only	Mechanical Draft Wet Cooling Tower	Natural Draft Wet Cooling Tower	Lake Only	Wolf Lake for Cooling	Mechanical	Natural Draft Wet Cooling Tower
7. Ratio of Rise Across Condenser to Max. Temperature Diff. (α)		0.515	0.575	0.579	0.528	0.572	0.589	0.593
8. Condenser Tube Data:								
a. Cleanliness Factor	%	85	90	90	85	85	90	90
b. Tube Size Used to Represent All Units		(1" OD, 18 BWG, 34' Long)			(7/8" OD, 18 BWG, 30' Long)			
9. Velocity Through Condenser Tubes	ft/sec.	7.0	7.0	7.0	7.0	7.0	7.0	7.0
10. Maximum Difference Between Condensing Temperature and Inlet Water Temperature (i.e., $\Theta R/\alpha$ = Item 5 ÷ Item 7)	°F	25.24	22.61	22.45	18.94	17.48	16.98	16.86
11. Condensing Temperatures (Item 4 + Item 10)	°F	90.24	109.61	115.45	83.94	110.48	103.98	109.86
12. Condenser Pressure at Design Conditions	"Hg.A.	1.43	2.57	3.00	1.17	2.63	2.18	2.59
13. Correction to Heat Rate from Turbine Thermal Kit	%	0.75	3.90	5.15	0.55	6.77	4.70	6.58
14. Correction to Load = $\frac{(-\text{\% Corr. to Ht. R.}) \times 100}{100 + \text{\% Corr. to Ht. R.}}$	%	-0.744	-3.754	-4.898	-0.547	-6.341	-4.489	-6.174
15. Correction Multiplier (1 + Item 14/100)		0.99256	0.96246	0.95102	0.99453	0.93659	0.95511	0.93826
16. Sent Out Generation at Valves Wide Open (Item 15 x 817,000 Kw Waukegan and Item 15 x 944,000 Kw State Line)	Kw	810,920	786,330	776,980	938,840	884,140	901,620	885,720
17. Change in Sent Out Generation, Over Base	Kw	Base	-24,590	-33,940	Base	-54,700	-37,220	-53,120
18. Increase in Auxiliary Power Requirements, Over Base (See Item 29)	Kw	Base	13,340	12,340	Base	12,190	17,320	14,570
19. Difference in Sent Out Capability (Item 17 - Item 18)	Kw	Base	-37,930	-46,280	Base	-66,890	-54,540	-67,690
20. Difference in Equivalent Capital Investment due to Change in Sent Out Capability, @ $100 per Kw	$	Base	+3,793,000	+4,628,000	Base	+6,689,000	+5,454,000	+6,769,000

COMMONWEALTH EDISON COMPANY
WAUKEGAN AND STATE LINE STATIONS

STUDY OF CIRCULATING WATER COOLING FACILITIES, Con'd.

Station		WAUKEGAN UNITS 6, 7 & 8*			STATE LINE UNITS 1, 2, 3 & 4			
Scheme		1	2	3	1	2	3	4
Description		Lake Only	Mechanical Draft Wet Cooling Tower	Natural Draft Wet Cooling Tower	Lake Only	Wolf Lake for Cooling	Mechanical	Natural Draft Wet Cooling Tower
AUXILIARY POWER REQUIRED FOR PUMPS AND TOWER FANS								
21. Number of Tower or Transfer Pumps		Base	5	5	Base	6/6	6	6
22. Horsepower Each Pump	HP	Base	2130	3080	Base	760/1770	2270	3030
23. Auxiliary Power to Each Pump	Kw	Base	1710	2470	Base	610/1420	1820	2430
24. Total Auxiliary Power Required for Pumping	Kw	Base	8530	12,340	Base	12,160	10,910	14,570
25. Traveling Screen (8 Req'd @ 5 HP/each)	Kw	Base	Base	Base	Base	30	Base	Base
26. Total Number of Fans Required for Mechanical Draft Towers		-	30	-	-	-	40	-
27. Horsepower Required, Each Fan	HP	Base	200	Base	Base	Base	200	Base
28. Total Auxiliary Power Required to Operate Tower Fans (Item 26 x Item 27 x 0.746 ÷ (0.95 x 0.98))	Kw	Base	4810	Base	Base	Base	6410	Base
29. Total Change in Auxiliary Power Required to Operate Pumps, Traveling Screens, and Fans, Over Base (Item 24 + Item 25 + Item 28)	Kw	Base	13,340	12,340	Base	12,190	17,320	14,570
30. Equivalent Capital Investment Value of Fuel for One Kw of Auxiliary Power (Data from Commonwealth Edison Co.)	$	77.22	77.22	77.22	71.11	71.11	71.11	71.11
31. Difference in Equivalent Capital Investment due to Auxiliary Power (Item 29 x Item 30)	$	Base	+1,030,100	+952,900	Base	+866,800	1,231,600	+1,036,100
FUEL COST DUE TO HEAT RATE								
Condenser Pressure (Repeat Item 12)	"Hg.A.	1.43	2.57	3.00	1.17	2.63	2.18	2.59
32. Correction to Net Turbine Heat Rate, from Turbine Thermal Kit	%	0.75	3.90	5.15	0.55	6.77	4.70	6.58
33. Correction Multiplier (1 + Item 32 ÷ 100)		1.0075	1.039	1.0515	1.0055	1.0677	1.047	1.0658
34. Station Heat Rate at 1.0" Hg.A. (Weighted Average for All Units)	Btu/Kwh	8950	-	-	9710	-	-	-
35. Corrected Station Heat Rate (Item 33 x Item 34)	Btu/Kwh	9020	9300	9410	9760	10,360	10,170	10,350

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COMMONWEALTH EDISON COMPANY
WAUKEGAN AND STATE LINE STATIONS

STUDY OF CIRCULATING WATER COOLING FACILITIES, Con'd.

Station		WAUKEGAN UNITS 6, 7 & 8*			STATE LINE UNITS 1, 2, 3 & 4			
Scheme		1	2	3	1	2	3	4
Description		Lake Only	Mechanical Draft Wet Cooling Tower	Natural Draft Wet Cooling Tower	Lake Only	Wolf Lake for Cooling	Mechanical	Natural Draft Wet Cooling Tower
FUEL COST DUE TO HEAT RATE, Con'd.								
36. Change in Station Heat Rate, Over Base	Btu/Kwh	Base	+280	+390	Base	+600	+410	+590
37. Equivalent Capital Investment Value of Fuel for One Btu/Kwh of Station Heat Rate	$	7,638	7,638	7,638	7,619	7,619	7,619	7,619
38. Equivalent Capital Investment Value of Fuel due to Difference in Station Heat Rate (Item 36 x Item 37)	$	Base	2,138,600	2,978,800	Base	4,571,400	3,123,800	4,495,200
MAINTENANCE COSTS								
39. Tower Maintenance	$/Yr	-	25,000	11,000	-	-	33,000	18,000
40. Incremental Pump Maintenance Costs; (Use $1500/Pump for High Head and $1000/Pump for Low Head) 12 Transfer Pumps to Wolf Lake	$/Yr	Base	7,000	7,500	Base	12,000	8,400	9,000
41. Traveling Screens	$/Yr	Base	Base	Base	Base	6,000	Base	Base
42. Miscellaneous Maintenance Cost of Added Facilities	$/Yr	Base	5,000	5,000	Base	10,000	8,000	8,000
43. Total Incremental Maintenance Costs	$/Yr	Base	37,000	23,500	Base	28,000	49,400	35,000
44. Present Value Over 20 Years (Item 43 x 10.0; See Note Below)	$	Base	370,000	235,000	Base	280,000	494,000	350,000
45. Equivalent Capital Investment (Item 44 ÷ 1.47; See Note Below)	$	Base	251,700	160,000	Base	190,500	336,000	238,100

NOTE:

Present Value for Annuity of $1.00 for 20 Years is $10.00;
Present Value of Carrying Charges on an Investment of $1.00 for 20 Years is $1.28; Use 15% Indirects;

Then Equiv. Cap. Investment = $\frac{\text{P.V. for 20 Yrs.}}{(1.28 \times 1.15)}$

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COMMONWEALTH EDISON COMPANY
WAUKEGAN AND STATE LINE STATIONS

STUDY OF CIRCULATING WATER COOLING FACILITIES, Con'd.

Station		WAUKEGAN UNITS 6, 7 & 8*			STATE LINE UNITS 1, 2, 3 & 4			
Scheme		1	2	3	1	2	3	4
Description		Lake Only	Mechanical Draft Wet Cooling Tower	Natural Draft Wet Cooling Tower	Lake Only	Wolf Lake for Cooling	Mechanical	Natural Draft Wet Cooling Tower
SUMMARY								
46. Change in Equivalent Capital Investment due to:								
A. Capability (@ $100/Kw --- See Item 20)	$	Base	3,793,000	4,628,000	Base	6,689,000	5,454,000	6,769,000
B. Auxiliary Power (See Item 31)	$	Base	1,030,100	952,900	Base	866,800	1,231,600	1,036,100
C. Fuel Cost due to Heat Rate (See Item 38)	$	Base	2,138,600	2,978,800	Base	5,028,500	3,123,800	4,495,200
D. Maintenance (See Item 45)	$	Base	251,700	160,000	Base	190,500	336,000	238,100
47. Total Change in Equivalent Capital Investment	$	Base	7,213,400	8,719,700	Base	12,774,800	10,145,400	12,538,400
48. Difference in Initial Capital Investment, Over Base (Including Top Charges)	$	Base	12,221,000	16,768,000	Base	46,861,000	23,258,000	33,327,000
49. Total of Equivalent and Initial Capital Investments, Over Base (Item 47 + Item 48)	$	Base	19,434,400	25,487,700	Base	59,635,800	33,403,400	45,865,400

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BID REVIEW AND AWARD ▨
DESIGN ▬ JOB NO. ____
BIDS ▥ DATE ____
SHIPMENT ▨ SHEET NO. ____
DELIVERY AND ERECTION ☐ NO. OF SHEETS ____

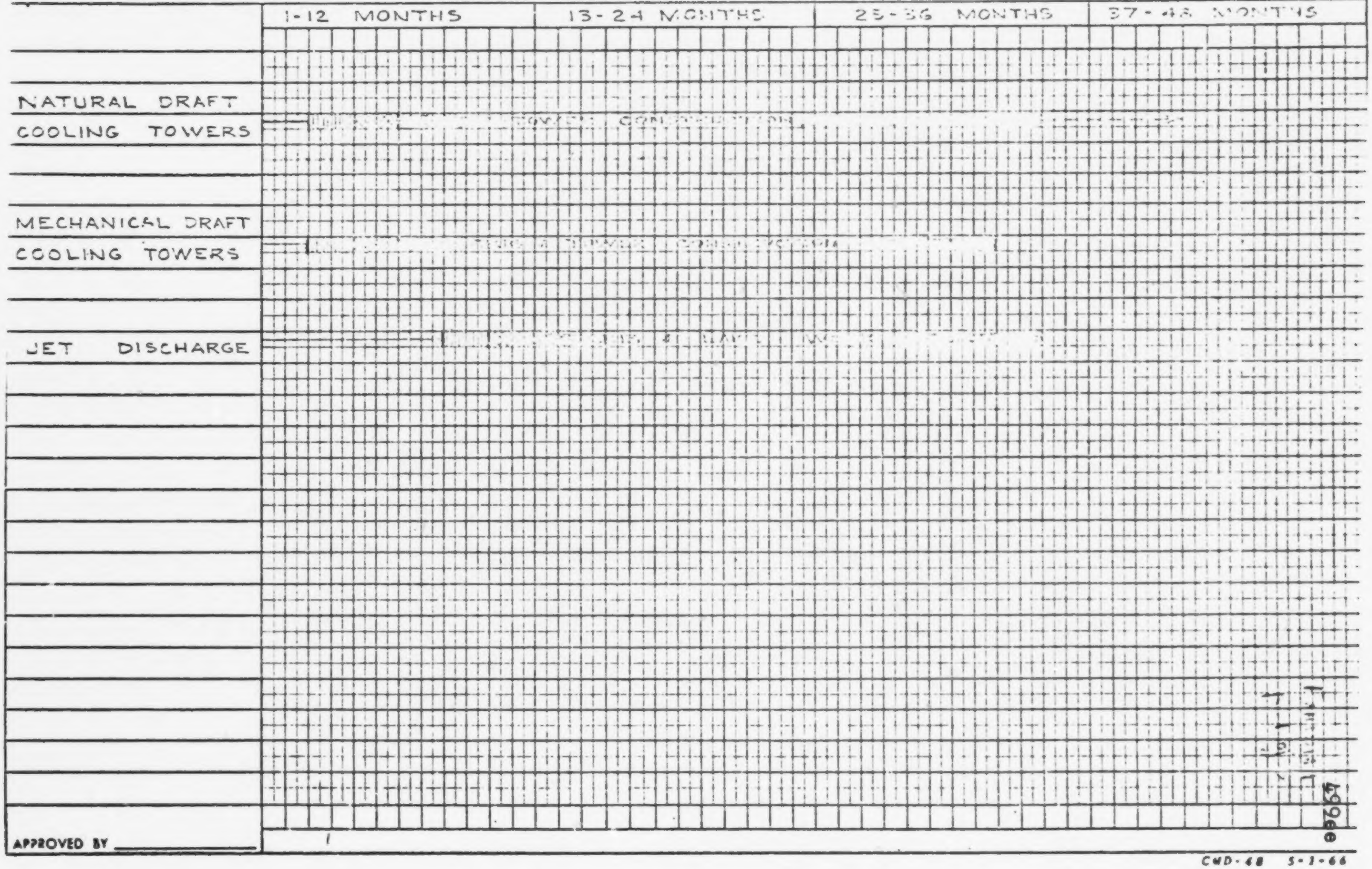
CONSTRUCTION SCHEDULE

COMMONWEALTH EDISON COMPANY
WAUKEGAN STATION

ALTERNATE COOLING SYSTEMS

SARGENT & LUNDY
ENGINEERS

– – – POSSIBLE TIME INCREASE DUE TO MFGRS BACKORDERS



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BID REVIEW AND AWARD ▩
DESIGN___ ▭
BIDS___ ▥
SHIPMENT___ ▨
DELIVERY AND ERECTION___ ☐

JOB NO.______
DATE______
SHEET NO.______
NO. OF SHEETS______

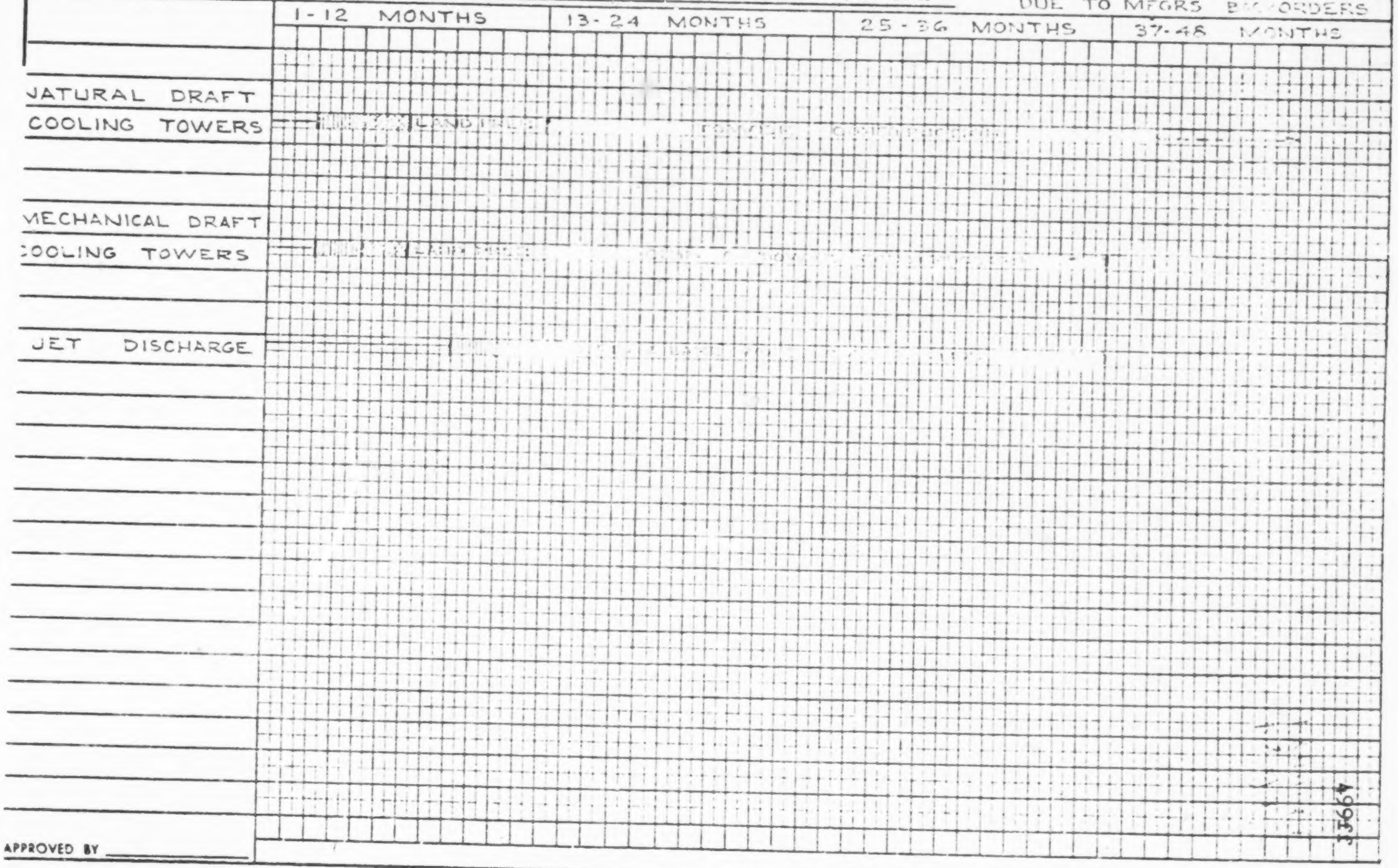
CONSTRUCTION SCHEDULE

COMMONWEALTH EDISON COMPANY
STATE LINE STATION

ALTERNATE COOLING SYSTEMS

SARGENT & LUNDY
ENGINEERS

– – – POSSIBLE TIME INCREASE DUE TO MFGRS BACKORDERS



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CONSTRUCTION SCHEDULE

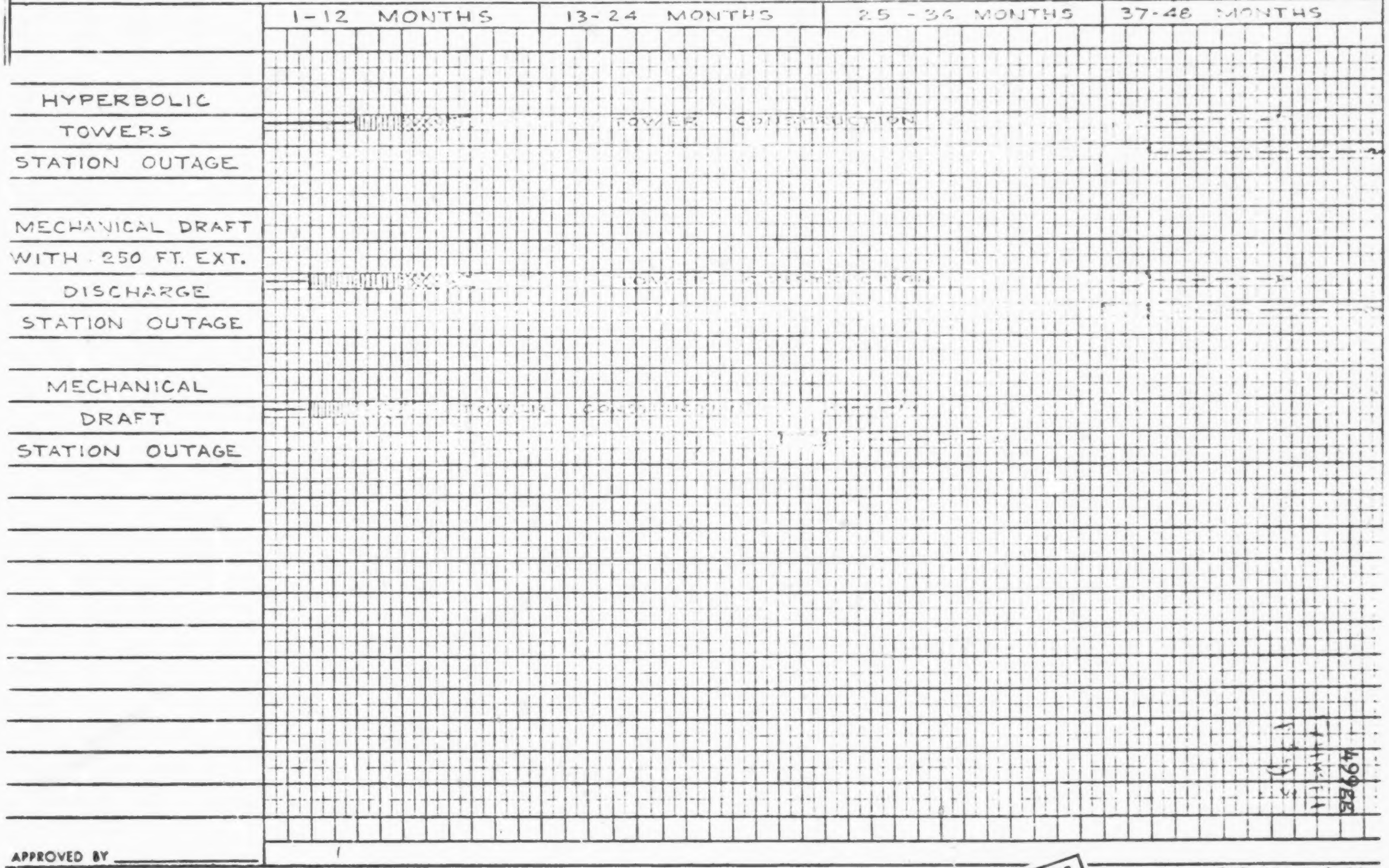
COMONWEALTH EDISON COMPANY
ZION STATION
ALTERNATE COOLING ALTERNATIVES

SARGENT & LUNDY
ENGINEERS

BID REVIEW AND AWARD ▩
DESIGN ▭
BIDS ▥
SHIPMENT ▨
DELIVERY AND ERECTION ☐

JOB NO. ______
DATE ______
SHEET NO. ______
NO. OF SHEETS ______

- - - POSSIBLE TIME INCREASE DUE TO MFGRS BACKORDERS



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proposed regulations in dealing with and proposing severe restrictions with respect to a plant like Waukegan which was built in 1927, which has been studied and restudied as to the effects of its thermal discharge into Lake Michigan and nobody — nobody has found any adverse effects from that discharge over that period of time of operation. Indeed it is well known on the north shore community that, in fact, fishermen seek out the Waukegan plume just as I gather from testimony this morning from Miss McKee that the same thing happens in the Traverse Bay area.

At this point, I think also I might clarify several matters that were raised this morning in connection with Dr. Langum's testimony with respect to our presentation of customer costs at the previous hearing held -- customer costs from the installation of a mechanical or natural draft wet tower cooling system at Zion.

Dr. Langum beat us over the head -- or tried to -- because he said that we had seriously misled everybody by presenting a bar chart in which we had distributed those costs of a mechanical draft wet tower to the residential customers only of the Commonwealth Edison Company, whereas he stated those costs would, of course, be borne not only by the residential but also by the commercial and the industrial customers.

I think Dr. Langum suffered by not having been present at the previous Four-State Conference. If he had been, he would have realized that we presented the bar chart — the page which he reproduced as page 17 in his testimony and exhibits — we presented that bar chart in response to a bar chart that had been presented by the Federal Water Quality Administration through Mr. Tichenor, and that chart had been prepared on exactly the same basis as the chart that we presented; namely; it distributed the costs of cooling systems to the residential customers.

Since we were with our chart responding to the Federal Water Quality Administration, we felt that, in fact, it would be misleading if we adopted any basis other than the basis which the Federal Water Quality Administration had adopted. Consequently, if there is misleading — if this is a misleading method or one that does not present the facts truly, then the accusation should be made against the Federal Water Quality Administration.

I also will take a minute on Dr. Langum's suspicion — I think that was his word — that there was something wrong with our $53.12 figure as the cost per kilowatt for the installation of a wet mechanical draft cooling system at Zion, as shown on our material that has been presented and which he reproduced as page 16 of his testimony, and you will recall that he said primarily that his reason for being suspicious of the $53 figure, which the Chairman of this Conference, then, with the help from Dr. Langum, transmuted into a 10- to 15-cent monthly increase for residential customers.

Dr. Langum was comparing our $53.12 figure with the $21 figure which had been shown as the cost for the Consumers installation -- Consumers Power installation -- at Palisades.

The fact of the matter is -- and I think Dr. Langum really ought to have known this -- is that the $21 figure of Consumers Power did not include operation and maintenance costs, loss of capability, and certain other items shown on page 16, and that consequently his comparison of the $21 Consumers Power cost should have been made not with our $53.12 figure, but with the $32.73 figure which is likewise shown on page 16 as the cost before taking account of these items that were not taken account of in the Consumers Power $21 figure.

Furthermore, Dr. Langum was frank to say that he is not an engineer. I think it must be perfectly clear that these cooling systems are not like loaves of bread, and you can't just assume that an installation at the Palisades plant is comparable with the installation that would be required at Zion. There are great differences.

We have presented full testimony, as a matter of fact, in this hearing, as to the basis for our figures and our estimates at Zion, based in part upon the peculiarity of design that we must engage in at Zion by reason of the air traffic on the north shore of the State and other circumstances.

Consequently, any attempt to assume that the 10- to 15-cent figure is based upon any valid information or comparisons made by Dr. Langum is, we think, out of line.

We would like to state, in conclusion, Mr. Chairman, that we believe that in lieu of the regulations -- the Federal regulations, as proposed here—that the conferees ought to give serious consideration to the statement and the recommendations made by United States Senator Adlai Stevenson whose statement was read and incorporated in the record yesterday.

Without getting into a discussion -- on which I am not an expert -- of the pecking order in Washington, I think it can fairly be said that Senator Stevenson is the highest-ranking Federal official to present testimony or a statement in these proceedings, and it consequently should not be disregarded.

That statement also, of course, was -- not of course but was reasonably close to the proposal embodied and adopted and recommended to this Conference by the Illinois Pollution Control Board, as embodied in the letter of March 15, 1971, from Chairman Currie to Mr. Stein.

We do ask that the conferees, in view of the circumstances which we have outlined here, the lack of factual data to support the Federal position, and in view of the data that we will submit as to the ramifications of these proposals -- at least so far as Commonwealth Edison is concerned -- we would ask the conferees to adopt Senator Stevenson's proposal.

MR. STEIN: Thank you.

Before I throw this open for discussion, I would like to say -- I would like to hear from the people before we decide on that 2 weeks' operation. I would like to hear the comments from the conferees before we give you a ruling.

MR. BANE: I might just say before you do take a vote that Mr. Comey asked this morning for 2 weeks to submit a statement of -- a comment on part A, and there was no dissent from the conferees on that request of his.

MR. STEIN: There was no agreement on that. Now, we -- I am not against this, but let me ask you: Will your figures that you talked about include in that analysis what it is going to cost the residential consumer each month?

MR. BANE: We will be glad to work that out, surely.

MR. STEIN: Now, I want to really say one thing before I open this. I wasn't trying to translate anything -- 10-cent or 15-cent cost of anything. I was just trying to understand what Mr. Langum was trying to say, and I think I did understand it when it related to the two plants.

Before I open this up, I don't know, Mr. Bane, if I understand your rules here. Maybe I am not familiar with the Illinois practice. But is it your view that since the United States Senator came up with something, he is the ranking man? I don't know what you are trying to do in protocol: 1) figure he outranks an Administrator 2) whether you are throwing out a challenge to Mr. Ruckelshaus to go to the White House to trump him, or 3) ascertain who has the greatest expertise? I don't understand this approach.

MR. BANE: I told you I wasn't an expert in pecking order, but I would assume that the Administrator ranks below the United States Senate since his --

MR. STEIN: I am not talking about the pecking order; I am talking about the whole philosophy of the way you approach this is the man who can produce the highest ranking officer coming in with a statement. If that is the way we apply the law in Illinois I am glad to know that. The next time I assure you I will come equipped.

MR. BANE: Well, are we to assume that when the Federal Government makes a presentation that is contrary to the recommendations of the United States Senator that those recommendations of the Senator are to be ignored?

MR. STEIN: No, this is again what I want to do. When you talk about the Federal Government making a recommendation, you have two: 1) you have a letter from Mr. Ruckelshaus, which, of course, is an Administrator's recommendation which was rather general; 2) you also had what you kept calling regulations, which are requirements which were presented by the Region. I would like to say before I throw this open for discussion, I didn't see these before either. I don't know which lawyer saw them, but I went through the same analysis you did, and I think the Region and the people who did this should be very thankful for you, Mr. Bane, because you have given them a thorough legal analysis.

I would hope that they would take your criticisms and your comments today in careful account to perfect these for the Executive Session, which we will have, because I think these questions surely need answering. I think I have given them the same comment myself, but I am glad to have it fortified by you. I know it isn't often that the Government can afford the legal talents that some of our clients can afford, but I think I for one should think the Region should be appreciative of your analysis of their proposal. I think they can be well advised to take your analysis into account to be sure that it answers those questions.

MR. BANE: Well, the importance is not the legal analysis, the importance is the factual consequences. I don't think it is reasonable to expect that we or any utility can analyze the effect on our Waukegan and State Line stations, for example, of a proposal that we learned about yesterday. And whereas these regulations seem to have been 5 or 6 months in the making, I do not think it is unreasonable for us to be allowed 2 weeks to tell the Federal Government what these regulations mean to us.

MR. STEIN: May we have comments or questions?

Mr. Purdy.

MR. PURDY: Just one comment, Mr. Stein and Mr. Bane. It would seem that you emphasize to the conferees that the first priority of consideration on the matter of backfitting ought to be the cost that might be required on the backfitting.

And my comment, from my standpoint, I think the first priority is to determine the need, and then the cost must come along and we must design our program so that we, say, have the least disruption of those facilities.

But I think, first of all, in my view, the priority must be the need for the backfitting.

MR. BANE: I agree with you, sir, and that was the reason that I mentioned -- I probably should not have done it in the order in which I did -- that one of the things that confuses us and puzzles us with respect to Waukegan, for example, is what is the need for backfitting on Waukegan, no matter what the cost might be, when the Waukegan plume has been operating since 1927 without any visible sign of any damage?

MR. STEIN: Any other comments or questions?

MR. MAYO: I think that the variety of Mr. Bane's comments, as they are directed to Mr. Ruckelshaus' letter, require a response.

I think perhaps the best I can do -- I could ask you to do this for yourself, but I will do it here in the context of a response to you -- by reading a portion of the Administrator's letter -- because I think it says very well what it is he recommends this Conference address itself to.

"... The Great Lakes are an irreplaceable National asset. One of these lakes, Lake Erie, has already suffered serious harm. The quality of Lake

Michigan waters, though still high, has begun a steady and measurable decline, with associated damage to its biological systems. Although several other sources of ecological damage to the lake exist, thermal discharges are increasingly important and may well accelerate the harm caused by other pollutants. It is my conviction that if there are feasible methods to avoid this serious risk of harm posed by thermal discharges, those methods must be adopted.

"We must recognize that many unknowns exist in the problem we now confront. Much research is required before we can fully understand the nature and extent of effects from thermal discharges. More must be known also about the specific water quality conditions of Lake Michigan. In the face of such unknowns, however, we must choose the course of caution. For far too long precautions against environmental damage have awaited a full understanding of the threat. The march of progress has aggravated environmental damage while proposed safeguards were under consideration or studies were being performed.

"In the case of Lake Michigan, we cannot afford further delay. Stringent standards must be established to prevent damage from thermal discharges. In particular, I believe that limitations should be placed on large volume heated water discharges by requiring closed cycle cooling systems using cooling towers or alternative cooling systems on all new powerplants and addition of such cooling facilities to plants now under construction.

"In addition to the development of stringent thermal standards for Lake Michigan, I would like to direct your attention to the need for setting implementation schedules for plants now under construction or in operation such that their discharges will be brought into compliance as soon as possible.

"I urge your consideration and adoption of clearly defined temperature standards and look forward to your submission of the conferees' recommendations to me in the near future."

So I think the Administrator very eloquently stated the basis for the concern. I think he very straightforwardly stated a charge to the conferees.

MR. BANE: Well, no one can quarrel with the Administrator's high regard for Lake Michigan, and, as a matter of fact, to match in eloquence, we might quote Justice Holmes who said with respect to the Great Lakes that they constitute a good deal more than an amenity. They were, in fact, a treasure; and indeed they are a treasure.

MR. STEIN: Didn't he say that about a river?

MR. BANE: I don't know whether he said it about a river or the Great Lakes.

MR. STEIN: That's the way I read that case.

MR. BANE: At any rate, he was talking about bodies of water. Bodies of water, whether they be rivers or lakes, are there for the use of the community. So long as no damage is done to them, and those uses, I think, include not only the interests of swimmers, fishermen, but to the extent that no damage is done, they are a treasure for the commercial and industrial life of the community.

Consequently, unless damage can be shown -- and our quarrel with the Administrator is that he relied upon what we regard as a discredited document, the "white paper," to reach his conclusion that electric power generation does damage that has to be corrected.

MR. STEIN: I want to ask Mr. Mayo that question because you have raised it several times.

I think there was an assumption made in Mr. Bane's statement, Mr. Mayo, and I would like you to comment on this, that the basis of the Commissioner's or the Administrator's letter was the "white paper." Is that your understanding?

MR. MAYO: No, the basis obviously for the Administrator's letter is the -- I just read it, and I don't think

I need to repeat it. It is stated there in the paragraphs that I read.

MR. STEIN: But answer the question, because I think Mr. Bane has repeatedly said — and I am trying to elicit from you people the point of view — that the basis of the Administrator's letter was the "white paper." I think I heard that 5 or 6 times in his original statement. He just said it again.

In your opinion, is this the case?

MR. MAYO: No. The letter makes reference to a portion — makes a couple of quotes from the "white paper," but certainly this does not constitute the basis for his concern, the basis for his recommendation. It is much, much broader than that.

MR. BANE: The "white paper" is the only document that the Administrator cites aside from himself?

MR. MAYO: So?

MR. STEIN: I think you have answered it.

MR. MAYO: I would have to say: So what?

MR. STEIN: Are there any other comments?

You know I am learning something about the power industry all of the time, and I thought I heard you say, Mr. Bane, that the electric company here, Consolidated Edison, was connected to the whole country except Texas.

Is that by the grid system?

MR. BANE: Yes, that is right. Our company is Commonwealth Edison not Consolidated.

MR. STEIN: I am sorry. I stand corrected.

But Commonwealth Edison is connected to the whole country except Texas by the grid system?

MR. BANE: That is correct. We have in this country a National grid system for power. The reason that Texas is not in it is because they are still unwilling to subject themselves --

MR. STEIN: How about southern Florida?

MR. BANE: Southern Florida?

MR. STEIN: Yes.

MR. BANE: I believe that is connected in, sure.

MR. STEIN: It is?

MR. BANE: Yes.

MR. STEIN: Well, that is interesting.

I will let you -- does anyone want to --

MR. DUMELLE: Mr. Stein, I would like to comment on Mr. Bane's request for 2 weeks. It seems to me that this is entirely reasonable. As I understand it, these recommendations by Mr. Ruckelshaus were given out at a meeting of the conferees the night before the Conference opened. I am sort of surprised of how the public members have picked this out, because they have been insistent of their rights to be present whenever the conferees got together, and it seems to me that the company is entitled to take a few weeks to get some additional facts and submit them.

MR. STEIN: Are there any other additional facts on that? The Chair has no objection to 2 weeks. I think that is reasonable unless I hear an objection.

MR. MILLER: Mr. Chairman, we heard this morning the comment that the government did not move fast enough, and we come here hoping to arrive at some decisions as to thermal standards, and now we are being asked to slow down in the process. I am sure before we get through why we, at the government level, will be blamed for slowing down the process and not arriving at them.

I certainly agree that there may be need to study this, but in going over it, I don't see a great deal of difference aside from the table of information that has been available in the Technical Committee's report. I certainly think there was ample time provided from the time the Technical Committee's report was submitted to review and determine what the effects would be upon the various companies.

MR. STEIN: Well, I have given my view. I would like to hear the others. I think we can go around, if you want, to make the judgment on whether they need 2 weeks. Now, let me give this to the conferees -- we heard an economic analysis from Mr. Langum. Presumably it is indicated by Mr. Bane that he will give us another kind of analysis or perhaps a rebuttal -- I am not saying it will be -- but another kind of economic analysis.

Now, if the conferees think that is desirable we can do this, if not, we can say what we are going to do. But I am not saying that you cannot come up with a determination before that.

MR. BANE: I wonder if I could just say in clarification that we are not concerned just with reworking the material we put in before but these proposals in part 4, as they affect our Waukegan and State Line stations, were brand new to us as of yesterday morning. I see nothing in the Technical Committee report that bears upon them, and I believe that we are entitled and indeed I believe the conferees would want to know what they are proposing, or what is being proposed with respect to existing generating plants in the way of cost, down-time, the effect on our capacity, the possibility of producing power shortages.

Those are things I think you ought to know.

MR. PURDY: Mr. Stein, as I understand this Conference, we cannot set standards as such through this Conference procedure. The standards in themselves will have to be set back at the State level unless we go through another Federal procedure -- set at the State levels, under State law, and the Federal law requires that public hearings be held by the States under the State law in the standard-setting process.

So, therefore, it seems to me that the additional information that some of the witnesses would like to present could be presented to the various States prior to the public hearings, if they so desire, or presented at the States' public hearings. I don't see that a 2-week delay to present additional information ought to delay the conferees from any decision.

MR. BANE: It seems peculiar to me that the conferees could reach a conclusion without having the type of information that I am proposing to submit, and indeed, I would think you would want to ask of every utility and every discharger who falls within part A whether a utility, industry, or whatever.

MR. STEIN: Mr. Bane, if you deem it appropriate, let me try to poll the conferees.

Mr. Mayo.

MR. MAYO: I agree thoroughly with Mr. Purdy's suggestion that the conferees -- I think we are obliged at this point in time to make their recommendations to the Administrator, and we should proceed to make those recommendations at this session.

I would not raise any objection whatsoever to the Commonwealth Edison or any of the other utilities having an additional 2 weeks to provide the conferees with additional data.

There will be ample time for the States to address themselves to any of this additional data in terms of the legislative processes that they must follow, and I agree with him 100 percent.

MR. BANE: I fail to understand the procedure. If this were a rule-making procedure within the --

MR. STEIN: Mr. Bane, please --

MR. BANE: If this were a procedure within --

MR. STEIN: May I check with Wisconsin first?

MR. BANE: I wonder if I might respond --

MR. STEIN: You can; if you think you are helping your cause, go ahead.

MR. BANE: If this were a proceeding governed by the Federal Administrative Procedure Act, you gentlemen would have been required to publish notice to give a full opportunity for hearing on these proposals, something certainly far beyond — due process requires something more than a 48-hour submittal of a proposal and then no opportunity to evaluate their effects.

MR. STEIN: Wisconsin?

MR. FRANGOS: Mr. Chairman, let me suggest that perhaps the conferees take this matter under advisement, and make a determination at the same time that they discuss and make a determination of what the recommendations of this Conference will be.

MR. STEIN: All right.

Let me — we can't decide this today, but we have had precedence on this before. I think Mr. Purdy points this out, and it was seconded — I think three of the States indicated this and the Federal conferee.

We have made determinations before, such as the voting regulation which required action by the States, other requirements which required action by the States, either administratively, to put an order into effect, or get a standard in operation.

If the conferees feel that it can come to a judgment now and the conferees want to keep the record open for 2 weeks, I can assure the conferees that the information presented in the record, which will be kept open, will be sent to the Administrator for his consideration.

Now, I think we should again look at the mechanics of this. I do not intend — and I think we can all recognize this — in conformance with the standard procedure — to send the recommendations up to the Administrator without a complete transcript of the Conference.

Now, maybe we can put this on the record if you want to. Mrs. Hall, what is your estimate. Two weeks before we get it?

MRS. HALL: At least.

MR. STEIN: All right. We won't have this transcript for 2 weeks. In other words, if you get this additional information, as far as I can see, this information will be in writing, and I think as far as getting the recommendation to the Administrator, there won't be any delay.

Now, again, I don't want to make any judgment, and if the conferees want to set this over, I will be glad to wait until you have had more time to think about it before we make a ruling, unless, as I feel here — unless Wisconsin and Indiana wish to express themselves differently at this time, we can dispose of the matter.

MR. BANE: I wonder if I can just say that I don't believe your proposal meets the requirements of due process. I think we are entitled to have the information that we wish to submit in the hands of the conferees while they are deliberating what conclusion they are going to arrive at.

MR. CURRIE: Mr. Chairman, have we decided anything?

MR. STEIN: Not yet.

MR. CURRIE: Are we planning to?

MR. STEIN: Well, it depends whether you want to decide it now. As I see, we have two proposals here: 1) to hold the record open for 2 weeks before we decide anything; and 2) a recommendation from the Wisconsin conferee that we take this proposition under advisement, think about it, discuss it, and have a ruling later tomorrow.

MR. CURRIE: Tomorrow? When is it contemplated that the conferees will decide on what their recommendation will be on the main issue before us: thermal pollution?

MR. STEIN: I hope we will present that tomorrow unless you want to defer it.

MR. FRANGOS: Mr. Chairman, what I would like to do this afternoon is perhaps hear the witnesses, and I think we are kind of getting into the area of discussing matters that we would be doing at the Executive Session. So I would urge that we go on with hearing the people that are here.

MR. STEIN: Without objection may we do that? Yes, we are going to defer that.

Are there any other comments to Mr. Bane's statement?

With that, Mr. Bane, thank you very much.

MR. BANE: Thank you.

MR. STEIN: We will now call on Wisconsin.

MR. FRANGOS: Mr. Sol Burstein with the Wisconsin Electric Power Company.

STATEMENT OF SOL BURSTEIN, SENIOR VICE PRESIDENT,
WISCONSIN ELECTRIC POWER COMPANY,
MILWAUKEE, WISCONSIN

MR. BURSTEIN: My name is Sol Burstein. I am with Wisconsin Electric Power Company and I have been here before. In fact, almost all of us have been here before and I apologize if some of us are beginning to sound a little tired and tiresome. I came to discuss the report of the Technical Committee on Thermal Discharges issued in January of this year pursuant to the conferee's instructions following the Workshop Sessions here on September 28-October 2, 1970.

In my opinion, the Technical Committee has made two basic errors in its report. Firstly, it equated the weight and credibility of the evidence presented on behalf of the zero-heat proponents with that presented by the opposition. I believe that material presented in support of no heat additions was contained almost exlusively in the so-called "white papers". The material was and remains highly speculative. On the other hand, presentations by utilities, and their consultants, including hard, scientific and engineering data. It is disturbing that the Technical Committee should evaluate these presentations as having equal authenticity and precision.

Secondly, having made this unfortunate evaluation which leads to the contradictions emphasized in the report, the Committee makes the recommendation for no heat additions. This conclusion cannot logically be drawn from the content of the report and I therefore assume it has its basis in some other source.

If we were to assume for the moment that such comparisons of speculation versus real-life data are not invalid, then the following summary of the report's conclusions are pertinent to the conferees' attention:

1. The committee believes the large amount of technical data presented to the Conference is largely contradictory and is inadequate upon which specific thermal criteria can now be based.

2. The committee concludes, although no damage to the ecology of Lake Michigan has been demonstrated from existing or presently authorized facilities, adverse ecological effects may occur with increased input of waste heat to the lake.

3. The committee states there is a period of time between the present -- where no demonstration of damage exists -- and the future, when it is possible that proliferation of heat inputs to Lake Michigan might cause

damage.

4. The committee accepts the fact that heat additions to Lake Michigan have no direct biological impact on man and any effects thermal inputs might have on aquatic life are reversible on reduction or elimination of the heat sources.

On this basis, it appears essential that the Enforcement Conference recommendations allow for a period of time during which actual observations of operating power-plants on Lake Michigan will provide the factual basis for realistic criteria. If adverse effects are detected and deemed in need of correction, I know of no responsible utility management that would not take prompt steps to make the necessary changes. In view of the reversibility of thermal effects, permanent damage to the aquatic environment of Lake Michigan is therefore not at stake.

I believe it is fair to state that the reasons this Conference created the Technical Committee and the reasons for this session lie in the significant technical presentations made by the utilities and their consultants at the last Workshop. I submit that the work reported on to the conferees was sponsored by the utilities in a sincere desire to provide objective information upon which these power companies could confidently base their operations and future designs. Hopefully, these studies would also assist regulatory authorities by adding to a better understanding of Lake Michigan characteristics and, hence, better criteria for its long-term protection.

Unfortunately, there has been some undeserved criticism of these efforts as having been funded by vested interests, and hence arbitrarily or capriciously designed to obtain predetermined conclusions. This is, of course, not true and impugns the professional reputations of highly competent scientists and engineers. I ask the conferees to give these eminent experts due consideration. If all these time-consuming and costly activities do not receive the attention due them, then obviously there is no point in their continuance.

One final comment on the Technical Committee's Report and one more on a real-life situation. Recommendations of the Technical Committee on chlorine discharges from powerplants on Lake Michigan appear insupportable. Concern has been expressed that marine organisms may be damaged by the mechanical and thermal shock of condenser transport. I believe many mechanical cleaning methods for condenser systems would contribute substantial mortality potential to these organisms. As an aside, my company has participated in a proposal to study condenser transport effects at Point Beach Nuclear Plant in an effort to provide specific data on these phenomena.

I presume everyone here is familiar with the recent decision by Consumers Power Company to add cooling towers to the Palisades Nuclear Plant, on the basis of which the intervenors in the AEC licensing proceeding have withdrawn their opposition. This decision to install expensive cooling towers, I note, was made by a power company not because that company had evidence of any potential adverse thermal effects on Lake Michigan waters from its original once-through cooling system. Rather, it was made on the basis that the implementation of the AEC licensing regulations would economically penalize this utility and its customers beyond the alternative of installing cooling towers.

I trust that the conservationists who succeeded in requiring Consumers Power to install cooling towers will be just as vigorous and tenacious in support of the rate increases which necessarily must follow. Anything less would cause serious concern as to the integrity of these motives.

My remarks at the 1970 fall workshops remain applicable. The cost to the electric ratepayer of this region for a no-heat standard remains very substantial and the benefits from these added financial burdens are for the present, by the Technical Committee's own words, doubtful.

It must be clear to the conferees that decisions related to thermal effects on Lake Michigan are being imposed in the absence of clear and precise recommendations upon which the respective States can act. Further reasons for prompt and realistic conclusions by this Conference should not be necessary.

Mr. Chairman, with your indulgence, and that of the conferees, as the result of the remarks made at the last 2 days I would like to add some things not in my prepared statement.

MR. STEIN: Go right ahead.

MR. BURSTEIN: It shouldn't take very long.

But we have heard a lot, sir, about scare tactics or alleged blackmail on the part of both power companies and conservationists.

Let me say that the dollars required for other than once-through cooling are real and vast, as are the other environmental effects from cooling towers. I estimate that it will cost my companies between $30 to $40 million for cooling towers at Point Beach and for the replacement capacity of the 80-odd megawatts it will take

S. Burstein

to run them, and from about $115 million for the other powerplants using Lake Michigan for cooling at Oak Creek, Lakeside, and Port Washington. This together with additional operating costs amounts to $40 million per year or roughly 17 percent of our last year's revenues.

Over the next 30 years, these dollars for Lake Michigan no heat additions are into billions, and they are real; they are not imaginary or speculative.

You will note that I disagree with the figures of Dr. Langum by something like a factor of 10, and, as has been indicated before, he did not include operating, maintenance costs, fixed charges, on some portions, nor the replacement power for the electricity to run the equipment.

Mr. Comey's announcement in regard to possible intervention in the Point Beach AEC licensing proceeding I also take to be real, and if he proceeds, the delays in providing the output from this plant will impair the abilities of my companies to meet the electrical demands of Wisconsin. This is not imaginary; it is a fact.

And, incidentally, I don't understand Mr. Comey's concern about legalisms, particularly if he proposes to intervene in a nuclear issue in an AEC proceeding in order to obtain a thermal discussion, a thermal decision.

I do not believe I am quoting from the letter presented by this same organization — Businessmen for the Public Interest — distributed to you and entered into the record, sir, from Mr. Polikoff, addressed to the Honorable Administrator William Ruckelshaus, when I quote from the third paragraph:

"It is not thermal pollution that has brought Lake Michigan to its present degraded condition. ..."

MR. STEIN: That is a different outfit, isn't it?

MR. BURSTEIN: No, sir, it is Businessmen for the Public Interest —

MR. STEIN: Okay. Go ahead.

MR. BURSTEIN: — and it is the same organization.

MR. STEIN: Thank you.

MR. BURSTEIN: I find myself in a strange or ironic position of agreeing substantially with Secretary Klein, with whom I have publicly disagreed before, particularly when Mr. Klein affirms that we must know what the vast sums to be spent will produce. This is exactly my point. I believe this is also the dilemma faced by the Technical Committee.

I know, at this moment, the best fishing in Lake Michigan is at the Point Beach nuclear plant, and I wish I could show everyone these pictures of the beautiful lake trout taken just yesterday or the day before at our Lake Michigan outfalls.

Similar to the histories at Oak Creek and Port Washington, it has been a year or more since we offered the facilities of the Oak Creek powerplant to evaluate the thermal effects from the largest existing powerplant on Lake Michigan.

Again, I would repeat, sir, there is a period of time between now when no damage due to thermal discharges exists, and some future time when additional sources are feared by some might cause adverse effects that are reversible.

Echoing Secretary Klein's comment, I believe this affords and indeed demands that we use this period to determine what we should intelligently do before we start doing it.

Thank you, sir.

MR. STEIN: Thank you, Mr. Burstein.

I think your statement is very clear. I feel I understand it.

Are there any comments or questions?

MR. FRANGOS: Yes. Mr. Burstein, I am wondering if I could ask you to repeat the figures that you presented in your unprepared remarks at the end in terms of the costs to Point Beach and to your system.

MR. BURSTEIN: Our very preliminary data indicates that Point Beach would cost between $30 and $40 million for the addition of cooling towers and the replacement power necessary to make up for pumping the water and powering the fans.

MR. FRANGOS: Is that for both units, sir?

MR. BURSTEIN: That is for the plants, yes, sir.

MR. FRANGOS: For the plants. All right.

MR. BURSTEIN: I anticipate similar costs on the other plants I mentioned that use Lake Michigan for once-through cooling would be approximately $115 million.

MR. FRANGOS: So what you are saying is almost --

MR. BURSTEIN: $150 million for some 3,700 megawatts of capacity, which is substantially different from Mr. Langum's figures of that same amount for 15,000 megawatts of capacity.

MR. FRANGOS: Yes, I understand.

MR. BURSTEIN: I am saying in addition to the fixed charges of this amount, which relate to or which translate rather to about $30 million a year, we will incur an additional $10 million annually for operating costs. So that the additional revenues required from the ratepayers in the State of Wisconsin is in the order of $40 million per year for these existing and operating facilities.

MR. STEIN: Are there any other questions or comments?

I have one observation, Mr. Burstein, and I say this because maybe we are going to meet many more times. Mr. Bane referred to due process, and I guess fortunately or unfortunately a man in my job in the water pollution business has the job of preserving due process for the very rich as well as the poor. It is not the most attractive job in the country these days. But you are going to have due process. As other people who come here, you are going to meet each other time after time. When you came in, you said you were tired about this, and maybe we will tire more. But let me call attention to one statement -- this isn't a question of criticism -- but I think until this is resolved we are going to be seeing a lot of each other.

When you talk about the opposition, from your point of view, you talk about this material and say this material was and remains highly speculative; you say, on the other hand, presentations by utilities and their consultants include hard, scientific, and engineering data.

Now, it has been my experience, as long as you have this attitude on either side, you are going to find yourself continually meeting the other side while I am going to be sitting here with the gavel to adjudicate.

I think the first sign for an agreement that I have found in these cases is when both sides at least have respect for the other people's experts and data.

Now, I will give you my view. I stated all through that workshop, I think a good portion of the data was contradictory. As I said, in 25 years or more, this is probably the kind of case where the testimony was as contradictory as any I have ever witnessed. When one person said "white" the other man said "black". When one person said "the jets should go up and do less damage", the other one said "it would go down." When one person said "if you just put out a jet laterally, it would go up", the other one said "it would go down", and a third one said "it would go sideways." Then we had a special one that said "it would go up most of the year, except when the temperature got to a certain level, and then it would take a flip and go down like a roller coaster."

I think it might help to resolve this if we really give due respect, as I have, to the testimony on all sides. I believe the people came in sincerely; they gave their best judgment and best views.

Now, I am not making any judgment, but I say when I see this, this portends to me that we are not very close. I hope we can get closer before long if we are going to resolve it. Really I do think I understand what you are saying. I think you have made a proposal; you have made a clear one; you have made a logical one. I don't know that the people would agree with it, but I understand what you are saying, and I am not disputing the internal logic of it. But I think at the same time the people who have different views are making a proposal and the notion that one is based on speculation and the other is based on hard, scientific fact may not be conducive to getting an agreement.

MR. BURSTEIN: Mr. Chairman, I do hope we get to an agreement, and I hope we get to those kinds of analyses and studies that will be realistic and will show actually what we are doing. But this is the matter of the whole Conference and the whole controversy and the predicament. We have taken a few isolated laboratory things and we have predicted what might happen. We have taken a few actual operating powerplants and we have said this is what is happening.

Now, really, sir, I think that is the key to our great concern: the fact that we can equate these two different types of investigations and say they are equally as precise and equally as important and applicable to our concerns.

I hope we get the kind of agreement and understanding of what we need to arrive at an agreement, and go ahead and do it.

MR. STEIN: Now, at the risk of oversimplifying, let's see if I can reduce your statement down to a point.

You have said there is no shown damage now, and in any event you have a period in between where there won't be damage.

Therefore, we should go to the plants as you propose them now with the once-through cooling system. Then if any problems develop they will be corrected, because there is no self-respecting power company which has demonstrated its interest in the public weal which wouldn't immediately go ahead and put in remedial facilities.

Isn't that correct?

MR. BURSTEIN: That is correct, sir.

MR. STEIN: Are there any comments?

MR. FRANGOS: Yes. I have one other question of Mr. Burstein which I think follows your comment, Mr. Stein, and that is perhaps the other side of the coin.

And let me put it in its simplest terms and perhaps not as eloquently as Mr. Ruckelshaus. But if indeed the evidence to date is contradictory, and if indeed there is a question, and if you followed this through one more step, and if indeed whatever cost may be incurred can be passed onto the consumer without consideration of what that cost is -- whether it is 10 cents, 20 cents or 50 cents -- the discussion we have had today, and if we somehow can accommodate the question of maybe maintaining power and power reserves, then what becomes the problem for the power industry to proceeding with some kind of cooling devices?

MR. BURSTEIN: Probably none, if all your "ifs" are answered, Mr. Frangos. But I again say, in going back to what we said earlier, there is question. I have quoted a number of references in my own remarks previously. There is question as to whether the thermal inputs from these plants do the kind of damage—have demonstrated any opportunity for doing the kind of damage about which you and the Administrator are speaking. We have not yet equated the chemical contributions with those of the thermal contributions.

I have spoken at the last workshop -- if you may recall -- that if what was said about power companies merely passing these costs onto their consumers and then earning a percentage on top of that, we could make more money for the stockholder. What's our purpose in opposing this? We honestly believe that the billions of dollars that the people around Lake Michigan are going to be required to pay for this will not derive any benefits -- absolutely -- otherwise I wouldn't be here.

I think there is no question that where we have indicated opportunity to provide pollution control devices, whether it be air pollution or water pollution, you have seen dramatic investments on the part of the utilities for non-income-producing apparatus and equipment in that interest.

MR. FRANGOS: Thank you.

MR. STEIN: Any other comment? I am going to zero in because I think Mr. Frangos is going to have to make a hard decision.

On the assumption you make, if the evidence is contradictory, as Mr. Burstein says if you take all of the "ifs" is great; but the first "if" is the one I don't believe we have.

You see, Mr. Burstein indicates that the material on one side, which you say is contradictory, was highly speculative. On the other hand, presentations by the utilities and their consultants include hard, scientific, and engineering data. But on this place you really, with that assumption, you don't satisfy one of your "ifs."

MR. FRANGOS: Well, I was just responding generally, not necessarily to the statement.

MR. STEIN: Right.

All right. Well, thank you very much, Mr. Burstein.

May we go to Indiana?

MR. MILLER: Mr. Chairman, I have Mr. Robert Mowers, representative of the Thermal Study Committee from Indiana.

STATEMENT OF JOHN R. BROUGH OF THE NORTHWEST INDIANA INDUSTRIAL COMMITTEE ON THERMAL STANDARDS FOR LAKE MICHIGAN, INDIA (READ BY ROBERT G. MOWERS)

MR. MOWERS: Contrary to what it says on the statement, my name is not John Brough. Mr. Brough had to leave to catch a plane and he asked me to read his statement instead.

My name is Robert Mowers, and I speak today on behalf of the Northwest Indiana Industrial Committee. This group was formed late in 1970 after several companies in Northwest Indiana decided to combine their efforts to fund and direct a study on the effects of thermal discharges to southern Lake Michigan. The committee was appointed by the participating companies to arrange for and supervise the study.

Limnetics, Incorporated, Environmental Engineers of Milwaukee, Wisconsin, were engaged to perform the study. It had the following objectives:

1. Collect, review and summarize thermal effects of industrial effluents on southern Lake Michigan with the aid of an infrared flyover and surface and sub-surface temperature measurements.

2. Review and summarize existing scientific literature on thermal discharges with particular emphasis on the papers relevant to Lake Michigan and testimony presented at the Lake Michigan Enforcement Conference in Chicago during September and October, 1970.

Some of the conclusions reached are:

1. The methodology for surveying the physical characteristics of thermal discharges to Lake Michigan proved to be very useful. Results from a mid-winter survey showed that the discharges lose their heat rapidly by mixing with the cold lake water and that the resulting plume areas are surprisingly small.

2. The amount of heat discharged to the lake by the companies was calculated to be insignificant relative to the heat to the lake from natural sources.

3. Some data on the effects of temperature on biological and fish life have been reported in the literature; however, conclusions reached to date are often conflicting and can be misleading because of a lack of basic data from well designed field experiments. A particular need is for more data on the effects of passage of water through condensers and coolers on the plankton and fish larvae.

4. Further studies should be started promptly

to provide proper data and criteria for setting new standards.

The last two conclusions are similar to those reached by the Technical Committee authorized by this Conference on October 29, 1970, to study the matter of setting standards for thermal inputs to Lake Michigan. On the basis of the literature review conducted in this study, we must agree with and endorse their statement that, "a lack of specific data and an abundance of general contradictory information on the effects of thermal inputs prevent assignment of specific numerical input limits at this time."

We also support the contention of the Technical Committee as expressed on page 4 of their report, which is as follows: "It was the consensus of the State Representatives that it would be their responsibility to enforce such limits and their laws require controls to be set on the basis of demonstrated damage or potential damage to water uses. The committee recognizes the value of receiving water temperature standards, but since there has been no demonstrated significant damge at existing Lake Michigan thermal plume sites from artificial heat inputs, the assignment of numerical effluent values or other engineering design requirements at this time would be arbitrary and not defensible." Thus, we believe that the existing State of

Indiana's thermal standards are adequate at this time for the portion of Lake Michigan adjacent to our plants. Only after in-depth studies are completed to establish a criteria should any new standards be set.

We also believe that there is ample time for development of the sound data and criteria needed for setting of sensible, realistic controls. Many warm water discharges from industry have existed for 20 or more years and to our knowledge have not resulted in any harmful effects on the overall biological and fish life. As evidence of our position, we have noted the recent reports of how the fish life is abounding in the warmer waters of southern Lake Michigan. For example, I quote from a recent article on page 9B in the March 7, 1971 issue of the Hammon (Indiana) Times: "Experts agree that fish taken from the 'big water' this season will be better than average in size and quality... Harold White, one of the Region's most knowledgeable anglers, said a number of big fish of all varieties should be caught on the lake this year... White said you can fish almost anywhere from the lake shore or you can use a boat... you can fish from around the Edison plant at the State line," White said, "or at places like Burns Harbor." Such a report although without scientific expertise, and attached to our report is certainly in line with the Technical Committee's statement that "there is limited concern about persistence or buildup in the water environment -- or about a direct effect upon the health or safety of men."

Lastly, our study has strongly substantiated the recommendation of the Committee that in-depth field and laboratory studies be made to determine the effect on the ecology of Lake Michigan of these thermal inputs. Limnetics have indicated that there is ample scientific information and engineering technology to design studies which could help resolve much of the controversy and confusion of this subject. The techniques developed in this study should be quite useful in further efforts to obtain meaningful data, and the results from our study in winter can be of value in planning future work.

Our study also has given us a background and an awareness that would be helpful in conducting future studies. We, therefore, suggest that the technical steering committee, as proposed in Recommendation No. 5 by the Technical Committee, include one or more representatives from industry. If given the opportunity, we would be glad to suggest the names of appropriate industry representatives and also to assist the steering committee in other ways toward the development and completion of a meaningful program of study.

I wish to thank the Conference for the opportunity to talk to you today. A copy of the report of our study will be made available to the State of Indiana Stream Pollution Control Board.

5432

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When the fish run,
everyone works
the Muskegon River

Going fishing can be fun if you catch enough fish

Text by
Bernie Biernacki

Bob Ladendorf displays huge Chinook salmon.

HAMMOND—The weather is improving and Calumet Region sportsmen are readying their fishing equipment for Lake Michigan's spring run.

Experts agree that fish taken from the "big water" this season will be better than average in size and quality.

A stocking program was begun five years ago and the trout and salmon which survived are now full grown.

Harold White, one of the Region's most knowledgeable anglers, said a number of big fish of all varities should be caught on the lake this year.

"We had some big ones taken last year," White said, "but I'm positive even bigger fish will be taken this time out."

Last year fishermen and fisherwomen brought in some fine catches. Some of them included:

—A 16-lb. 8-oz. German Brown Trout caught by James Gillard of Calumet City.

—A 32-lb. 41½-inch Chinook Salmon taken by Eugene Rodriguez of Hammond.

—A 12-lb. 12-oz. Rainbow Trout hooked by Val Kovalcik of Whiting.

—An 18-lb. Steelhead Trout caught by Mrs. Joan Bacner of Calumet City.

It isn't easy to land a champion size fish. It takes patience, skill, the correct equipment and a little luck.

The first thing one has to check is the weather.

At the present time weather conditions are just about right for fishing in Lake Michigan.

The warm sun has been breaking up the ice and the southern winds have been blowing it out into the lake.

Herring, Perch, and Smelt move in closer to shore, the offshore water begins to warm up.

These fish are in turn followed by the larger Coho and trout.

"When the Smelt are running the best," White said, "the Coho are at their best."

The run starts mid March and continues until mid May.

"As soon as the water temperature gets into the 50's and 60's," White said, "the run will end and the fish will retreat to the colder waters in the upper part of the lake."

The Trout, Coho and Salmon need cold water to survive.

With a little help from the weather, area fishermen should soon be out in force.

Be sure you have a state fishing license. And if you are out after Coho, Trout or Salmon be certain to buy a new Trout stamp.

Both the license and the stamp are available at any sporting goods store.

You don't have to have a special rod or reel to catch lake fish.

A spinning, spin-cast or casting reel will do fine.

The weight of the line varies. Some people will use a 15- or 18-lb. test casting line or a 12-lb. mono-filament line.

Bait is something else though.

Artificial bait fans say a Little Cleo, a K-O Wobbler or a Tad Poly are the best.

But live bait they are big minnows, Coho and Salmon spawn bags or the old reliable night crawler is the best.

When you get the gear together then you can head for the lake.

White said you can fish almost anywhere from the lake shore or you can use a boat.

"You can fish from around the Edison plant at the state line," White said, "or at places like Burns Harbor."

"Really, you can fish for these beauties anywhere you can get a line to reach them," he said.

If you are not good at casting or if you have a boat, simply go out and meet the fish as they swarm in.

When venturing onto Lake Michigan it is advisable to use a 14 to 16-foot boat with high gunwales.

The lake can get choppy and the bigger the boat the better.

White said that if you have a motor rated 25 horsepower or better, it would be wise to have a small auxiliary motor aboard in case of emergency.

Another safety precaution to have aboard are Coast Guard approved life jackets for each person.

Many of the lake fishermen find great success in trolling.

Out 50 feet to 100 yards from shore, the fishermen let their lines out and slowly drift along.

The spring run is about to begin with the smaller Coho and Trout. The larger fish staying out in deep water until late April or May.

If the angler is fortunate enough to catch a 36-lb. Chinook Salmon, a 20-lb. Coho or any other large lake fish, the best thing to do would be to have it mounted. The large amount of oil in a fish that large makes it almost impossible to eat.

The smaller fish are edible if smoked first.

Special fish smoking kits are available and most commercial fisheries will take care of your catch if you would rather not do it yourself.

Dick Rudzinski holds up a pair of Coho salmon.

Times Photos
by Dick Rudzinski

Thank you.

MR. STEIN: Thank you.

Are there any comments or questions?

Thank you very much. I wish you would give my appreciation to Mr. Brough for this, and also I wish sometimes one of these committees would give me a fundamental contradiction of the operation of the Stein Law of Committees. And I would like to see it reversed once. I refer to what happens in all committees. In Item No. 4 you say further studies should be started promptly.

Okay. Thank you very much.

Let's go to Michigan. Mr. Purdy.

MR. PURDY: The Indiana and Michigan Electric Company, Mr. Robert Kopper.

MR. KOPPER: The presentation on behalf of the company will be made in three sections: first, by myself; and Mr. Miskimen will cover a specific subject; and it will be closed by our counsel in this matter.

MR. STEIN: Pardon me. Just for purposes of procedure here. It is getting close to 5:00 o'clock. We will go with this, but how long will that take?

MR. KOPPER: I don't think it will take over 30 minutes for all three.

MR. STEIN: How many more will we have to go after this? Would the conferees consider recessing until tomorrow morning to hear the rest?

MR. MAYO: How many more are there?

MR. MILLER: I have one.

MR. PURDY: Two.

MR. STEVEN E. KEANE: We have one from Wisconsin. Mr. Frangos isn't there. You have about a 4- or 5-minute statement is all there.

If there is any possibility of getting it on tonight it would certainly be appreciated.

MR. CURRIE: I have no others that I know of.

MR. STEIN: How much will the two that — you have got three.

MR. PURDY: I have got three counting Indiana and Michigan; a half hour for Indiana and Michigan. I will have to check with the others.

MR. STEIN: I think it would be, again — maybe if — and you will have to check this with Mr. Frangos.

Let's go with this presentation and hear the one from Mr. Frangos, and unless there is objection, I think the better part of valor would call for a recess so we can approach this freshly tomorrow.

MR. KEANE: Mr. Chairman, before this starts, could I rise to a point of order and ask a question on behalf of two utilities from Wisconsin who have very short statements. We have spent 2 days here thus far. To go back home tonight and come back again in the morning to spend the sum total of about 10 minutes in representation would appear to be somewhat useless.

Would the Chairman accept our statements in writing --

MR. STEIN: We would accept --

MR. KEANE: -- in the next 2 or 3 days? We won't bother the conferees.

MR. STEIN: We would accept it in writing, but I was going to suggest to the conferees this: We have several utilities here with very short statements. Would it be possible to put those on first so they have an opportunity to go home and then we can see where we go. Is that agreeable?

MR. KOPPER: Sir, I have problems, too. We were scheduled to be on yesterday and I have a firm commitment to be in New York tomorrow for a very important meeting, and I would like to get my statement on now on behalf of my company.

MR. STEIN: I understand all your wishes, and I recognize that sometimes the wishes of the various utility companies may come in conflict with each other, but I am asking the conferees to make the judgment.

MR. PURDY: I would like to proceed as called.

MR. STEIN: All right. You may proceed.

(Robert M. Kopper's statement follows.)

STATEMENT OF ROBERT M. KOPPER, EXECUTIVE VICE PRESIDENT AND CHIEF OPERATING OFFICER, INDIANA AND MICHIGAN ELECTRIC COMPANY, FORT WAYNE, INDIANA

MR. KOPPER: Mr. Chairman, conferees, ladies and gentlemen, my name is Robert M. Kopper and I am Executive Vice President and the chief operating officer of Indiana and Michigan Electric Company. I appreciate this opportunity to present I&M's views on the recommendations of the Lake Michigan Enforcement Conference Technical Committee on Thermal Discharges to Lake Michigan dated January 1971, and to commend the Committee on the constructive and thoughtful nature of its report which, although we cannot but it whole, is a refreshing contrast to the confusion which preceded it.

Indiana and Michigan Electric Company supplies electric energy to more than 188 communities in the States of Indiana and Michigan. The demand for electric energy in our service area has been doubling every 8 1/2 years. As a public utility, we have an obligation under the law to see that the power requirements of the 1,600,000 people whom we serve are satisfied in a reliable manner. In meeting this obligation, we also fully recognize that we have the additional responsibility, the same as any other responsible citizen, to protect our environment. This dual responsibility of supplying the power needs of the people without wasting resources and simultaneously providing for the protection of our environment must be the major consideration underlying any recommendations made by this Conference.

A substantial part of the growing demand for electricity is to operate equipment and devices used to control, reduce or eliminate discharges to the air and water that are known to cause harmful effects. It is now eminently clear that millions of additional kilowatts of power will be required to operate new facilities being installed by industry and municipalities to overcome known pollutants. Our job, as I indicated before, is to provide the power requirements of our customers for whatever use, and at the same time to perform in a responsible manner with respect to our environment. To meet this twofold responsiblity all of our new powerplants are designed and are being built to have a minimal impact on the environment. We wish it were possible to produce electric power with zero impact on the environment, but it is not as of today. Consequently we have two goals -- 1) meet the needs for electric power, a substantial amount of which is for improvement of our environment; and 2) generate this power in a manner compatible with environmental considerations. This is what all of us are striving for.

As we advised the conferees during the Conference Workshop last September, we presently have under construction on the shore of Lake Michigan at Bridgman, Michigan, the Donald C. Cook Nuclear Plant. This $400 million facility, of which about $150 million has already been expended, will consist of two 1,100 megawatt units. The plant will utilitze the once-through method of condenser cooling, and is being built in accordance with a construction permit issued, after a public hearing, by the Atomic Energy Commission and a permit issued, also after a public hearing, by the United States Army Corps of Engineers. The design of this cooling system is based upon what we believe to be the best information and the best technical advice available to eliminate any possibility of significant adverse effects to the ecology of Lake Michigan. In addition, the Michigan Water Resources Commission has authorized our use of the lake for cooling water discharges, subject to the condition that if injury to the lake should result from such use, the Indiana and Michigan Electric Company would take whatever corrective action might be necessary. I want to assure this Conference that we are fully in accord with this stipulation. The record will show that the Indiana and Michigan Electric Company has been responsible for substantial scientific study of Lake Michigan. I think it is worthy to note that our studies indicate that the once-through method of cooling that we are using for the Cook Plant will not injure Lake Michigan. I must also point out that we have had considerable experience with alternative means of cooling and these, depending upon location, can have adverse aesthetic, land use, and meteorlogical effects.

With regard to the primary purpose of this Conference -- the establishment of thermal standards for Lake Michigan -- this has indeed been a most difficult and trying year. Difficult and trying for those of you who have the official responsibility for preventing damage to Lake Michigan; difficult for the environmentalists (including ourselves) who are concerned that the lake be safeguarded; and most difficult of all for those of us who have the responsibility for ensuring that this region is provided with an adequate and reliable supply of electric energy -- and who, therefore, must undertake to construct, well in advance, the facilities which are necessary to assure the provision of this essential service.

In this connection, let me point out that the construction of this plant was commenced in April of 1969 pursuant to the then existing Michigan antidegradation thermal standard, which is still in effect and which requires "no injurious effect". However, not content with this standard, during the past 12 months, a multitude of conflicting thermal standards have been proposed. A number of these proposals were conspicuously absent of any scientific or research basis and, if adopted, would have unnecessarily delayed the construction of all generating stations on Lake Michigan. I think a review of the rapid rise and fall of the standards proposed for Lake Michigan over the past year will clearly show that this approach to the establishment of thermal standards can only lead to chaos and beyond this, and more important, in no way has served the public interest -- neither in terms of protecting the environment nor in meeting essential power requirements.

For us at the Cook Plant, it all began about mid-March of last year when the staff of the Michigan Water Resources Commission proposed fairly reasonable numerical limits as a substitute for the Michigan antidegradation standard. In response, the Federal Water Quality Administration came in with two sets of numerical limits of its own -- both much more restrictive than those proposed by the Michigan staff. However, before the Michigan Water Resources Commission could act upon these proposals, two officials of the Department of the Interior proposed and announced a 1° temperature rise limitation. This proposal was made public in a most casual, off-the-cuff manner, and completely undercut the numerical limitations which FWQA's technical staff, not much more than one month before, had proposed for the Michigan segment of the lake. I believe it must be generally agreed that the 1° policy pronouncement was somewhat less than the kind of responsbile action we have the right to expect.

That was in May of last year. In mid-September, shortly before the Workshop Conference, a different concept, also having its origin in Interior, was introduced -- the concept of "no significant discharge" of heat to the lake. What did this new concept mean? Did it in fact mean no discharge of heat whatsoever? Was it perhaps simply a restatement of the 1° proposal? Or was it more flexible than the 1° proposal? There was little way of knowing.

Then, during the period from September 28 through October 2 of last year, very extensive technical data on thermal pollution effects were presented to the conferees here at the Sherman House by a number of highly qualified scientists. After that, in response to nothing presented at the Conference Workshop, the conferees in Executive Session came up with what appeared to be a totally new approach to the problem -- a series of B.t.u. input limitations -- and established a Technical Committee to evaluate this concept.

At approximately the same time, one State proposed a 5-year moratorium on "further construction of thermal powerplants on Lake Michigan" and another in effect proposed that no man-made heat be permitted to enter the lake.

It was against this background of rapidly shifting, often conflicting, proposed thermal standards that the construction of the Cook Plant had to proceed. I am sure all will agree it would have been physically impossible to alter our plant design as often as changes have been proposed in the thermal standards for Lake Michigan. We cannot impose this kind of irresponsibility on the consumers of electricity who, in the last analysis, must bear the cost. Nor can those of us responsible for power supply, which is essential to the preservation of the environment, accept the imposition of such irresponsible standards.

MR. STEIN: Let me interrupt there. What we will hear today will be the representatives of the other power companies. If you want to have a statement put in the record, you may make your arrangements accordingly.

Would you continue, sir?

MR. KOPPER: We had hoped that all of this confusion was now behind us. In the Recommendations of the Technical Committee dated January of 1971, we thought we perceived the light at the end of the tunnel. That was before the announcement of a new Federal proposal yesterday. I'm sure the Technical Committee's Report will not please everyone. I would like to point out some of the problems we have with this report. At the bottom of page 3 it gives no recognition to the studies of actual thermal plumes from Lake Michigan powerplants, the results of which were described by Dr. John C. Ayers of the University of Michigan during the Conference Workshop. Also, we seriously question Recommendation No. 8 which apparently would eliminate the use of chlorination as a means of preventing the buildup of algae growth in the condensers. Mr. T. A. Miskimen will explain our position on this in detail. On a more fundamental matter, we disagree with Recommendation No. 4 which purports to shift this burden of proof by requiring the conclusive demonstration of a negative -- the absence of ecological damage. No such burden could be sustained, least of all in the absence of actual operating experience at the respective plant sites. This is like requiring a person to prove the non-existence of ghosts or that he is not a criminal. Such a requirement violates due process. Recommendation No. 4, also if adopted by the conferees, must speak in terms of "significant" or "material" ecological damage.

However, the foregoing not withstanding, we nevertheless regard the Technical Committee's Report on balance as a significant step forward. It has, in our view, begun to deal with possible problems on the basis of facts, technical information, and reason. It has laid to rest a number of misconceptions with respect to thermal effects on the lake. It has helped to clear the air. For example: the Technical Committee recognized that "there has been no demonstrated significant damage at existing Lake Michigan thermal plume sites from artifical heat inputs" (page 4). This is progress.

And the committee recognized that in the absence of such demonstrated damage, the establishment of numerical effluent values or other engineering design requirments would be "arbitrary and not defensible" (page 4).

It also recognized that, under the law, controls must "be set on the basis of demonstrated damage or potential damage to water uses" (page 4). In this connection, I would point out that Recommendation No. 4, which would require the installation of supplemental cooling facilities at all powerplants on the lake unless the industry is able conclusively to demonstrate the absence of ecological damage, appears to be at variance with this basic legal principle. I would again point out emphatically that in the absence of a demonstration of significant damage, any requirment that would force scrapping of millions of dollars of existing investment, expending millions more, and delaying the operational date of generating plants would materially prejudice the rights of millions of citizens to adequate and reliable electric power at reasonable rates and would violate the rights of millions of people -- consumers of electricity as well as stockholders -- protected by due process of law.

It was not too long ago that a great deal of concern was being expressed regarding a possible cumulative buildup of heat in Lake Michigan over a long period of time and the possible lake-wide adverse effects which such a cumulative buildup might create. We believe that the Technical Committee's Report has laid this fear to rest once and we hope for all. The report recognizes that persistence or buildup of heat in the lake is of "limited concern" (page 5) and that to the extent that discernable thermal effects may exist, they will be primarily local in nature "lying mainly at or very near the heat source" (page 5). This shifting of emphasis from lake-wide cumulative heat buildup effects to the specific characteristics of each plant site is, we believe, a salutary development. This is in accord with the evolving body of scientific knowledge as reflected in the recently publicized report entitled "Effects of Thermal Discharges on the Mass/Energy Balance of Lake Michigan." Its author, Dr. J. G. Asbury, worked under the direction of Argonne National Laboratory's Center for Environmental Studies.

The Technical Committee also correctly recognized that no emergency exists which would justify the precipitous promulgation of hastily considered restrictions on the use of the lake for cooling purposes and that in fact the situation is such as to "allow a period of time for the establishment of sensible controls" (page 5). Presumably, such "sensible controls" would be based upon a firmer body of evidence than exists at the present time.

Most heartening is the fact that the Committee has recognized that closed cooling systems are not necessarily the only answer to thermal discharges and that properly designed once-through cooling systems may be equally effective in avoiding any possible damage (page 9). This is very much a move in the right direction.

Also, the Committee is to be commended for its restraint in resisting the temptation to recommend the imposition of specific engineering requirements for cooling and discharge systems. The Committee apparently recognized that, in view of the present state of our knowledge, it is most desirable for the various powerplants to proceed on the basis of a diversity of approaches, rather than to attempt to lock all of the plant into one or two uniform engineering molds which might later prove, on balance, to be the least ecologically desirable. The wisdom of this position received support recently from Dr. Asbury, the author of the Argonne National Laboratory study to which I have previously referred, who was reported by Nucleonics Week as saying that "... the effects of cooling towers are not fully known. They could be far more detrimental than those of the discharges." With respect to the design of our discharge system, model studies of discharge phenomena -- involving both physical modeling and mathematical modeling -- are presently in progress. These studies will contribute to the body of knowledge regarding what constitutes the most environmentally advantageous discharge design.

Indiana and Michigan Electric Company has funded and will continue to fund an extensive series of pre- and post-operational studies of the effect which once-through cooling may have on the ecology of Lake Michigan. These studies are being conducted by highly distinguished, independent researchers. In this connection, we note that the Technical Committee's Recommendation No. 5 calls for in-depth field and laboratory studies to determine the effects on the ecology and that these studies would be conducted under the guidance of a technically competent steering committee to be appointed by the conferees. I pledge to you our company's fullest cooperation in such studies which, as we understand them, will take about 5 years to complete and evaluate.

We have come a long way since the last meeting here in Chicago, 6 months ago. Until yesterday morning, of course, the Technical Committee's Report reflects this progress. While we have some disagreements with the Report, we regard it on balance as a temperate and constructive document which will put an end to much of the emotionalism that has been associated with thermal discharges. With the Technical Committee's Findings and Recommendations now before us, it will not be possible for rational people to return to the confusion of the very recent past when a proposed 1^{o} effluent standard, unsupported by any evidence of ecological damage, occupied the center of the stage. Nor would it be possible for us to support the newest Federal proposal which viewed in the light of the Technical Committee's report is already arbitrary, capricious and indefensible.

We believe that scientific research and observation, particularly of local effects as they relate to discharge design, should be intensified.

We also believe that the public interest compels recognition of the distinction between plants in existence and under construction, on the one hand, and future plants on the other hand. The costs and delay associated with backfitting a plant with additional equipment are much greater than if that equipment had been incorporated in the original plant design. Also, equity and fair play forbid continually changing the rules in midstream and applying them retroactively. Such an approach is particularly unfair and unnecessary where, as here, there has been no evidence that any significant adverse effects have resulted from the warm water discharges of existing plants. Plants under construction should be permitted to go forward undelayed and be put into operation. Their operation should then be closely monitored, and if it should be demonstrated that modifications in the discharge design would be in the overall public interest, such modifications should be made. We believe that this approach is in accord with the

Technical Committee's Findings and Recommendations and in accord with due process of law.

Industrial cooling is a legitimate water use on a par with other legitimate water uses. The law recognizes this. The Technical Committee recognizes this (page 7). Those of you who bear the responsibility for establishing thermal standards for Lake Michigan also must recognize this. In establishing such standards, you must take into account not only protection of the lake's ecology and the region's need for electric power, but also the effects which alternative means of cooling would have upon the meteorology, land use and aesthetics of the Lake Michigan shoreline. For it is all of these elements that go into making up the public interest -- something that both Indiana and Michigan Electric Company and this Conference are committed to serve.

MR. STEIN: Thank you, Mr. Kopper.
Are there any comments or questions?
If not, thank you very much.
And may we go on, Mr. Purdy?

MR. KOPPER: Mr. Miskimen, please.

STATEMENT OF T. A. MISKIMEN, SENIOR ENGINEER OF THE ENVIRONMENTAL ENGINEERING DIVISION, AMERICAN ELECTRIC POWER SERVICE CORPORATION, NEW YORK CITY, NEW YORK

MR. MISKIMEN: Mr. Stein, conferees, ladies and gentlemen, I shall read only portions of my prepared statement.

MR. STEIN: Do you want the entire statement to appear in the record?

MR. MISKIMEN: Please, sir.

MR. STEIN: Without objection, it will be entered as if read fully.

(Mr. Miskimen's statement may be found in its entirety on pp. 568-572.)

MR. MISKIMEN: I am Thomas Miskimen of the American Electric Power Service Corporation. My remarks here are directed to the chlorination of circulating water.

Of the recommendations that were submitted to this Conference by the Technical Committee, Recommendation No. 8 calls for requiring the installation of mechanical cleaning devices to replace chemical methods of coping with the problems of organic growths in condenser tubes.

Of the recommendations submitted yesterday, this is No. 4.

This is a restriction that was not discussed at the workshop last year; and this restriction is not supported in the body of the report of the Technical Committee. The arguments for and against such a course of action have not been explored adequately anywhere in a public meeting or hearing.

Chlorination is used to sterilize drinking water supplies by adding sufficient chlorine to give 0.1 to 0.5 p.p.m. of free chlorine after 30 minutes or more of contact. Chlorination also is used in higher dosage to sterilize the discharge of sewage treatment plants.

However, for the circulating water of powerplants, it is not necessary to feed chlorine in such a quantity as to produce complete sterilization of the water. And, for such cooling systems, chlorination is not maintained continuously under normal circumstances. For the cooling systems of powerplants, chlorination is used only to prevent the accumulation of attached organisms which primarily cause trouble when they grow on the surface of the tubes in the condensers, but which sometimes cause trouble by plugging the intake or discharge structures. To prevent organic growths, chlorine is fed at dosages similar to those for drinking water, and typically for only two or three periods per day each of 30 minutes. Thus the dosage is applied to the attached organisms for 30 minutes, every 8 or 12 hours. However, to free-floating organisms, this treatment is applied only for as long as is required for the floating organisms to pass through the treatment zone which would require only a few seconds and up to perhaps 1 to 10 minutes depending on the plant layout. This short period of exposure is much less than a less accepted sterilizing treatment.

This type of chlorination of circulating water is not used to remove organic growths that had accumulated at some previous time; it is used to prevent the first growths of attached organisms.

The mechanical alternates to chlorination are small balls or brushes that are propelled back and forth through the condenser tubes while the unit is in service. These can brush off certain types of organic growths. However, such devices are applicable only to certain types of condensers, and they clean only the condenser tubes. A trial of one type of such device on the AEP System has proved disappointing; and other trials in the United States are reported to have given only limited success.

However, in contrast, our inquiries about chlorination experiences have given consistently favorable

T. A. Miskimen

reports:

1. In the United States, on freshwater streams and lakes, we have found not one report of damage to biota outside of the condensers when chlorine was applied with normal proper control as a "preventative" treatment.

2. At the powerplants of the AEP System, where chlorination has been practiced for more than 30 years, there has been no observed instance of damage from chlorination.

The language of Recommendation No. 8 could be thought to include chemical cleaning jobs as well as the chlorination of circulating water. To powerplant engineers and chemists, these are different procedures. The language of yesterday's Recommendation No. 4 was somewhat different.

But from this discussion, we can conclude that the recommendations of the Technical Committee either for the elimination of chlorination of circulating water or for chemical cleaning -- these have not been justified. Such elimination has not been justified by any of the workshop presentations; it has not been justified by the body of the report of the Technical Committee; it has not been justified in any other hearing or public session known to industry people; and it has not been justified by our own considerable experience.

Consequently, I urge that this ban against chlorination be withdrawn.

Thank you for your attention.

MR. STEIN: Thank you.

MR. MISKIMEN: Thank you, sir.

And our next speaker will be Mr. James Henry.

MR. STEIN: Do you have a copy of your report, Mr. Henry?

MR. HENRY: No, Mr. Chairman, nothing but longhand notes which I prepared last night.

REPORT TO
THE FOUR-STATE LAKE MICHIGAN ENFORCEMENT CONFERENCE

CHICAGO, ILLINOIS

March 23 & 24, 1971

CHLORINATION & CHEMICAL CLEANING
FOR INDIANA AND MICHIGAN ELECTRIC CO.

BY

T. A. MISKIMEN
Senior Engineer of the
Environmental Engineering Division
American Electric Power Service Corp.

Mr. Stein,
Conferees,
Ladies and Gentlemen:

This statement is presented in the interest of the Indiana & Michigan Electric Company, which is building the Donald C. Cook Nuclear Plant south of Benton Harbor, Michigan.

I am Thomas Miskimen, a Senior Engineer in the Environmental Engineering Division of American Electric Power Service Corporation.

My remarks here are directed to the chlorination of circulating water

Of the recommendations that were submitted to this Conference by the Technical Committee, Recommendation No. 8 calls for requiring the installation of mechanical cleaning devices to replace chemical methods for coping with the problems of organic growths in condenser tubes. Of the recommendations submitted yesterday, this is No. 4

This is a restriction that was not discussed at the Workshop last year; and this restriction is not supported in the body of the report of the Technical Committee. The arguments for and against such a course of action have not been explored adequately anywhere in a public meeting or hearing.

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However, for the circulating water of power plants, it is not necessary to feed chlorine in such a quantity as to produce complete sterilization of the water. And, for such cooling systems, chlorination is not maintained continuously under normal circumstances. For the cooling systems of power plants, chlorination is used only to prevent the accumulation of attached organisms, which primarily cause trouble when they grow on the surface of the tubes in the condensers, but which sometimes cause trouble by plugging the intake or discharge structures. To prevent organic growths, chlorine is fed at dosages similar to those for drinking water, and typically for only two or three periods per day each of 30 minutes. Thus the dosage is applied to the attached organisms for 30 minutes, every 8 or 12 hours. But this treatment is applied ~~to~~ to free-floating organisms for only as long as is required for the floating organisms to pass through the treatment zone which would require only a few seconds and up to perhaps 1 to 10 minutes depending on the plant lay-out. This short period of exposure is much less than ~~sufficient~~ a sterilizing treatment ~~to kill many free floating organisms.~~ .

This type of chlorination of circulating water is not used to remove organic growths that had accumulated at some previous time; it is used to prevent the first growths of attached organisms.

The mechanical alternates to chlorination are small balls or brushes that are propelled back and forth through the condenser tubes while the unit is in service. These can brush off certain types of organic growths. However, such devices are applicable only to certain types of condensers, and they clean only the condenser tubes. A trial of one type of such device on the AEP System has proved disappointing; and other trials in the United States are reported to have given only limited success.

However, in contrast, our inquiries ~~Inquiries~~ about chlorination experiences have given consistantly favorable reports:

1. In the United States, on fresh water streams and lakes, we have found not one report of damage to biota outside of the condensers when chlorine was applied with normal proper control as a "preventative" treatment.
2. At the power plants of the AEP System, where chlorination has been practiced for more than 30 years, there has been no observed instance of damage from chlorination.

The language of Recommendation No. 8 could be thought to include chemical cleaning jobs as well as the chlorination of circulating water. To power plant engineers and chemists, these are different procedures. The language of yesterday's Recommendation No. 4 was somewhat different.

I have spent most of my career working in power plant chemistry. I have engineered the chlorination equipment for the circulating water systems for several power plants; and I have planned and directed many chemical cleaning jobs.

To me, chemical cleaning is a process used to remove rust, deposits, or ordinary dirt from power plant equipment, either before the item of equipment is first put into service, or during some later outage for maintenance. Chemical cleaning jobs are not done ordinarily while the equipment is in normal service. Chemical cleaning solutions can vary from the equivalent of a strong dish washing solution to 10% or more of hyrochloric acid - depending on the job. The cleaning solutions can and should be carefully disposed of, after use, in such a manner so as to avoid all pollution.

In a modern power plant, many pieces of equipment must be cleaned occasionally with chemical solutions. Boilers in many plants must be cleaned once every two or three years. Condensers must be cleaned if they become seriously fouled with deposits such as iron oxides or lime from the cooling water. For many of these problems, there is no satisfactory method of cleaning by mechanical methods. Only chemicals will do the job.

These chemical cleaning jobs are for the removal of accumulated deposits; and in a condenser, they may be for removal of deposits that are largely or entirely inorganic. These jobs are altogether different from the preventative treatment throughout routine operation of feeding chlorine periodically into the circulating water to prevent the attachment and growths of biological organisms.

From this discussion of power plant chemical cleaning jobs, and of circulating water chlorination, we can conclude that the recommendation of the Technical Committee either for elimination of chemical cleaning, or for elimination of chlorination of circulating water, has not been justified. Such elimination has not been justified by any of the workshop presentations; it has not been justified by the body of the report of the Technical Committee; it has not been justified in any other hearing or public session known to industry people; and it has not been justified by our own considerable experience.

Consequently, I urge that Recommendation No. 8 should not be adopted by this Conference.

Thank you for your attention!

T. A. Miskimen

TAM/dw

STATEMENT OF JAMES B. HENRY, VICE PRESIDENT AND GENERAL COUNSEL OF AMERICAN ELECTRIC POWER SERVICE CORPORATION, NEW YORK CITY, NEW YORK

MR. HENRY: My name is James B. Henry. I am Vice President and General Counsel of American Electric Power Service Corporation, which furnishes legal and other services to Indiana and Michigan Electric Company. I am also Secretary of Indiana and Michigan Electric Company.

Now, we understood that the purpose of this meeting was to comment on the recommendations of the Technical Committee to this Conference. Mr. Kopper has given our comments on this subject.

However, in typical fashion, when we arrived at this Conference yesterday, we were confronted with a policy statement from Mr. Ruckelshaus, the recently appointed Administrator of the Environmental Protection Agency, plus ill-considered standards on thermal discharges, apparently concocted overnight by the Federal conferees on this Conference.

As I said, this appears to be typical. I believe in virtually all of these sessions, Federal conferees have presented unanticipated standards at the beginning of the session, whether purposely or inadvertently, to create confusion, would be hard to say. It is also hard to say whether it was purposely or inadvertently that the proposals of the Federal conferees were designed to undercut the recommendations of the Technical Committee.

Those recommendations, in essence, found that there has been no demonstrated significant damage at Lake Michigan plume sites from artificial heat inputs, but that further studies were needed in order to decide what, if any, numerical standards as to heat inputs should be adopted.

In reaching those recommendations, the Technical Committee has devoted vast study to the various issues. Yesterday, we heard representatives of the Federal Power Commission and of the Atomic Energy Commission who committed those agencies to much the same position on the basis of their own studies. Thus, all agencies responsible for protection of the environment from water pollution and for production of power in the Lake Michigan area would appear to have a uniform position with the exception of Mr. Ruckelshaus and his associates.

Mr. Ruckelshaus has presented his policy statement in the form of a letter to the conferees of which perhaps the most significant sentence is this appearing on page 1, and I quote it: "A considerable and growing body of evidence indicates that serious ecological damage will be caused by the increasing use of Lake Michigan waters to dissipate waste heat." I submit that this statement is flatly untrue and that there is no such evidence.

On the contrary, available evidence indicates, as the recommendations of the Technical Committee state, that no such damage can be shown. To the extent that there may be problems with pollution in Lake Michigan, there is no evidence which suggests that heat from powerplants is a factor. The feeding of nutrients to the lake from sewage plants and other sources is the culprit here, and those interested in preserving the lake should zero in on these true targets and stop concentrating their efforts on the powerplants, even though the powerplants present an easier target for emotional attacks.

In any event, Mr. Ruckelshaus, on the basis of no evidence and without even dignifying by mentioning the recommendations of the Technical Committee, sitting in his office in Washington, has perceived a mandate to halt immediately by fiat all once-through cooling for large powerplants on Lake Michigan not yet in operation. This position is obviously purely political, yielding to those vociferous groups who substitute emotion for information. Can this kind of purely political position be sustained legally?

It is one thing to propose restrictive thermal standards for plants not yet under construction, even though one may doubt, as the Technical Committee doubted, that an evidentiary basis exists for setting such standards. It is quite a different thing to require the waste of assets and resources created by requiring the backfitting of existing plants and plants under construction.

The whole point of departure of the present effort to set standards for thermal discharges into Lake Michigan was a highly imaginative projection of what might happen by the year 2000 if powerplant construction continued at the present compound rate of growth.

In contrast to this imaginary framework, there is not a scintilla of evidence that any significant damage to the ecology of Lake Michigan could be caused by permitting once-through cooling at plants now operating or under construction, and specifically by the Donald C. Cook plant. No grounds exist for ringing down an iron curtain on water use in 1971 on the basis of what might happen by 2000 in the absence of regulation.

Now, I will not attempt to comment on the specific proposals which the Federal conferees have thrown together presumably in hasty response to Mr. Ruckelshaus' letter.

These are but the latest of a series of arbitrary proposals which they have advanced. It is sufficient to point out that each new set of arbitrary standards unsupported by evidence increases the credibility of all such proposals by the Federal conferees.

A perversion of the administrative process is going forward here. It is apparent from the statements of Federal conferees yesterday that they will seek -- and I quote -- the cooperation of the State conferees, but that absent conformity to their wishes, brass knuckles will be brought forth in an effort to compel approval of Federal standards arbitrarily adopted for political reasons.

To take the position, as the Federal conferees do, that conclusive evidence that no damage by powerplants now under construction is a prerequisite to the use of a once-through system and refusal to permit operation of such a system even subject to a requirement that corrective action will be taken if significant damage is shown, thus ignoring the existing evidence that, in fact, there will be no significant damage, is to abdicate the responsibility of reaching an informed judgment based on the best available evidence.

It is to abdicate the responsibility of weighing all aspects of the public interest in making the best use of available resources.

I urge this Conference not to participate in this abdication of responsibility. I will say also that the course which Mr. Ruckelshaus and the Federal conferees are attempting to dictate at least insofar as it affects the Donald C. Cook plant now under construction is arbitrary and capricious within the purview of the Administrative Procedure Act, and is in violation of due process of law. And I would like to associate myself with Mr. Bane in requesting 2 weeks in which to file possible additional comments to be used by the Conference as a basis for reaching a decision.

MR. STEIN: I will make the same ruling as the other.

Now, I hope we understand this procedure. Constantly you have referred to Federal conferees. Who are the Federal conferees -- plural -- you are talking about?

MR. HENRY: Well, perhaps I don't have the structure firmly in mind, but I was thinking specifically, I suppose, of Mr. Mayo.

MR. STEIN: That is one Federal conferee. I am the Chairman, and I am not -- I have made no comment about the proposal or what we were going to do, and so forth. Now, we have just one Federal conferee here, and if you impugn all that to the one conferee I am going to have to give him a chance to answer.

One of the things I heard you say that he apparently concocted his recommendations overnight.

Mr. Mayo, do you care to comment?

MR. MAYO: It is patently untrue. I think that is all I need to say.

MR. HENRY: Well, if it is patently untrue, may we ask why it was that we were not afforded a chance to see this until the day the hearing started?

MR. MAYO: The proposal came as a companion-piece with Mr. Ruckelshaus' letter to the conferees.

MR. STEIN: Are there any further questions?

You know, I have been sitting at these Conferences a long time, and I have often been tempted to ask the industry why I haven't seen their statement before the Conference either; but I never really have.

MR. MAYO: I am surprised at some of the language you used, Mr. Henry, when you speak to the proposed regulation as being arbitrary and capricious and conceived on the spur of the moment, when your fellow representatives of the power industry in an earlier statement spoke to the consideration of very much the same kinds of numbers by the State of Michigan almost a year ago, and referred at that time to an FWQA input into the development of those numbers, and the consideration of those numbers by the State of Michigan. These are very much the same numbers, and it seems inconceivable to me that you can make that kind of a statement in the face of that kind of a record.

MR. HENRY: Well, it was my understanding --

MR. MAYO: I think you are going much, much out of bounds.

MR. HENRY: It was my understanding that the purpose of the Technical Committee was to study various standards that have been proposed, and come up with a recommendation. And when, in the face of such a recommendation, you pulled together bits and pieces of earlier proposals and present them as a reasoned set of rules, I submit it is arbitrary and capricious.

MR. MAYO: I disagree with you.

MR. STEIN: Well, now, I wonder if you would care to comment on this. Now, I have been sitting around for a long time on this in various cases. I have heard Mr. Kopper praise that Technical Committee. He talked about it being thoughtful and constructive. Then you had a little report in between dealing with chlorine, and then you come up with the same company talking about Mr. Mayo concocting something overnight and shifting it. And back in Brooklyn where I come from and the age I come from, we always called that the Mutt-and-Jeff approach.

MR. HENRY: Well, I think we had no criticism of the Technical Committee report except for certain aspects which Mr. Kopper commented on. My remarks were not addressed to that; my remarks were addressed to these Johnny-come-lately papers.

MR. STEIN: All right.

Are there any other comments or questions?

If not, thank you very much.

I believe Mr. Petersen wants to put something into the record.

Mr. Petersen.

This will be the last one today.

STATEMENT OF O. K. PETERSEN, ATTORNEY,
CONSUMERS POWER COMPANY, JACKSON, MICHIGAN

MR. PETERSEN: Thank you, Mr. Chairman.

Gentlemen, my name is O. K. Petersen. I am an attorney for Consumers Power Company.

Yesterday, there was some discussion of pump storage plants. It had not been our impression that hydroelectric facilities were intended to be covered by the standards under consideration. The considerations involved are quite different.

Examples include temperature differentials, the length of time during which facilities are operated, and feasibility of alternatives.

If this Conference determines that it will make recommendations applicable to pump storage facilities, proper notice should be given so that a full review is possible.

Also, according to my understanding, the Governor of Wisconsin has suggested a 1973 deadline for the installation of closed circuit cooling facilities on Lake Michigan electric generating facilities.

In our opinion, material delivery dates and construction feasibility would make it impossible to meet such a date.

I might also say that Dr. Langum's testimony reviewing certain figures from Consumers Power Company's annual report were his own, and were not prepared as part of any Consumers Power Company presentation, and we do not necessarily adhere to his figures. We have not examined them, and know nothing else about them.

We have examined, however, the recommendations of the Lake Michigan Enforcement Conference Technical Committee on Thermal Discharges to Lake Michigan, dated January 1971.

That committee, as you will recall, found, and I will come within the 10 minutes -- the committee recognizes the value of receiving water temperature standards, but since there has been no demonstrated significant damage at existing Lake Michigan thermal plume sites from artificial heat input, the assignment of numerical effluent values or other engineering design requirements at this time would be arbitrary and not defensible.

Also, unlike many other waste problems, there is limited concern about persistence or buildup, and I will not continue that quote, you will find it in the statement — only to drop down to the next paragraph and say the committee believes that the above characteristics of the waste heat problem in Lake Michigan are such that they do allow a period of time for the establishment of sensible control.

Rather than comment in full detail, at this time, we will submit a copy of our comments immediately following my comments here.

Generally speaking, we find that the evidence available supports the already quoted conclusions, and we generally agree with the proposals therein except for certain unsupported nontechnical political positions which found their way into the comments — the document.

And we — then yesterday we came and heard a letter from Administrator Ruckelshaus to the conferees. We appreciate Mr. Ruckelshaus' commendation of our recent agreement to backfit the Palisades plant with cooling towers. However, in candor we must inform you that we do not believe that the cooling towers were necessary in order to protect the environment.

Further, reflection leads to the conclusion that Mr. Ruckelshaus' letter was based on the now largely discredited 1970 "white paper" and does not reflect the sober consideration of all of the evidence indicated in the quotations from the Technical Committee report.

We have had a very brief opportunity to consider the latest discharge regulations proposed by the Federal conferee. That time has not been adequate to enable us to prepare appropriate comments. Nevertheless, it is our opinion that the broad approach taken is not supported by the evidence, and that if the recommendations are adopted as standards, they will not be enforceable by the statement of Michigan, presumably by the other States, or by the Federal Government under existing law.

I would associate myself with Mr. Henry's comments concerning their arbitrariness and capriciousness. We note also that the recommendation includes what appear to be effluent values, of the type which are characterized by the Technical Committee as being, at this time, "arbitrary and not defensible."

We urge the conferees to proceed along the path indicated by the Technical Committee subject to our comments on the Technical Committee report to meaningful enforceable standards, and we, too, will submit further comments on the latest Federal conferee position within 2 weeks, and we understand the ruling which has been heretofore given. And, of course --

MR. STEIN: The ruling is that the record is open again.

MR. PETERSEN: I understand that the record is not open but that the conferees --

MR. STEIN: No, we haven't made a ruling yet, Mr. Petersen.

MR. PETERSEN: Ah!

MR. STEIN: We won't until tomorrow.

MR. PETERSEN: I did not understand then.

MR. STEIN: Right. I wanted to make that clear.

MR. MAYO: I would like to make one statement, Mr. Chairman, and that is to emphasize that the letter from Administrator Ruckelshaus to the conferees was, in fact, based on a considered appraisal of the material presented at the workshops -- the Technical Committee report. It was not politically motivated; it was motivated by the desire on the part of the Administrator of the Environmental Protection Agency to strive to achieve timely, meaningful and corrective controls of thermal discharges into Lake Michigan. That was the motivation.

MR. STEIN: Well, just as Chairman might say that the conferee prepares this and not the Chairman, so I have nothing to do with this. But I might say that the people who were talking of no scintilla of evidence, to make accusations like this of a personal nature of the conferee, I didn't hear any supporting evidence either. Or maybe it is in the record and I missed it, and maybe I will catch it when I read the record. But so far I didn't hear anything except the bad statement of supporting evidence.

Mr. Frangos.

MR. FRANGOS: I have no questions. I just --

MR. STEIN: I thought you had something you wanted to put in.

MR. FRANGOS: Well, are you finished with Mr. Petersen?

MR. PETERSEN: I would have to say that I do not recall having made any statement on behalf of Consumers Power Company which personally attacked the Federal conferee.

MR. STEIN: Right.

Your statement will appear in the record as if read, without objection.

(Mr. O. K. Petersen's statement follows in its entirety.)

COMMENTS REGARDING THE:

Recommendations of the Lake Michigan
Enforcement Conference
Technical Committee

on
Thermal Discharges

to
Lake Michigan

January 1971

By: Consumers Power Company - March 23-24, 1971

The action of the Conferees authorizing the formation of a technical committee to again review the facts regarding thermal discharges into Lake Michigan was encouraging. Some misgivings were certainly justified. Three of the four Federal representatives appointed to the committee took an active part in supporting the now infamous September 1970 White Paper of the US Department of the Interior, which was drafted in an attempt to support Undersecretary Klein's 1° proposal of May 7, 1970. With a fresh approach, and the benefit of considerable expert testimony given at the Lake Michigan Enforcement Workshop in Chicago on September 28 - October 2, 1970, there was hope that the technical evidence would be properly weighed and supportable conclusions reached. It is our opinion, however, that the committee's performance falls considerably short in several respects.

The committee persisted in repeating some of the errors of the "White Paper" authors. Moreover, the committee went further than the scope of technical evaluation and reached improper conclusions as to political issues.

Let us review the committee's conclusions and recommendations in sequence.

1. "The committee recognizes that existing water pollution control laws in the Four Lake Michigan States permit the use of Lake Michigan for domestic and industrial water supplies, for the propagation of wildlife, fish and aquatic life and for domestic, agricultural, industrial, recreational, and other legitimate uses including their use in the final distribution of the water borne wastes of our economy. The committee further recognizes that all Four States can order the abatement of demonstrated pollution resulting from thermal discharges as well as other sources. The existing laws also permit action to prevent pollution should there be reasonable assurances that such pollution will occur. The committee has agreed that there has been no demonstrated significant damage at Lake Michigan plume sites from artificial heat inputs, however, it is the concensus that the studies which have been conducted at these plume sites are inadequate to thoroughly assess the possible effects."

COMMENT: The single most important technical finding of the committee is:

> "There has been no demonstrated significant damage at Lake Michigan plume sites from artificial heat inputs."

This justified finding was made with the knowledge of thermal discharges which have existed for years. The committee's concensus that the studies conducted to date are inadequate to "thoroughly assess the possible effects" is certainly true, and will quite likely always be true. The areas of knowledge in which comprehensive theories exist or are imminent are extremely limited.

2. "The committee has determined from knowledge of (a) thermal and biological principles, (b) field and laboratory studies of Great Lakes fish and other organisms, and (c) field and laboratory studies in other areas, that the use of Lake Michigan waters for the dissipation of waste heat may be damaging to the ecology of the lake. Of particular concern is the damage that may be occurring to phytoplankton, zooplankton, benthos, and to egg, larval, and juvenile life stages of important fish species. The committee believes that local adverse effects that may occur can be corrected by the reduction of the use of Lake Michigan waters for waste heat dissipation."

COMMENT: The committee thus expresses an opinion, based on general knowledge, that "the use of Lake Michigan waters for the dissipation of waste heat may be damaging to the ecology of the lake." (emphasis supplied) It must be borne in mind that this is a mere possibility. Inasmuch as it has not been "conclusively demonstrated" that thermal discharges into Lake Michigan are not beneficial, the converse may possibly be true. Nonquantified possibilities, as opposed to a demonstrated likelihood, or probability, are inappropriate for use as a basis for regulatory action.

3. "In reviewing the waste heat burden to Lake Michigan the committee has concluded that discharges of waste heat from controllable sources other than thermal electric power generating facilities are at present a relatively small part of the total waste heat discharges to the Lake. Therefore, in the judgment of the committee, control of heat from such lesser sources as vessels, water treatment plants, municipal sewage treatment plants and industrial installations does not require waste heat control measures at this time."

COMMENT: Considering the presumption of the committee, that heated discharges per se might be damaging to Lake Michigan, without regard to quantative relationships, this is clearly an inconsistent position. But, the committee apparently considered the position to be expedient.

4. "The committee therefore recommends that all thermal electric power generating facilities using or planning to use Lake Michigan water for the dissipation of artificial waste heat be required to have closed cycle cooling systems, or such other techniques as may be approved by the Lake Michigan Enforcement Conference, under construction by a date considered reasonable and appropriate by the Conferees, unless it has been conclusively demonstrated to the Lake Michigan Enforcement Conference that ecological damage does not or will not occur from once-through cooling."

COMMENT: This recommendation of the committee is nothing more than a political conclusion, the apparent purpose of which is to avoid governmental responsibility for Lake Michigan research and to pacify certain vocal environmental groups which have been critical of past governmental action. The committee's introductory remark that, "It has also taken an approach that it hopes will tend to force adequate field and laboratory research into an area where rhetoric is profuse but information for judgment is either sorely lacking or strikingly contradictory." indicates blatant political maneuvering to effect research by coercion rather than by a common dedication to scientific inquiry.

The usage of the conclusionary word "therefore" in the first sentence shows that the recommendation is based, at best, only on the mere possibility outlined in conclusion 2 above. It is virtually impossible to conclusively demonstrate almost anything, including demonstrating that ecological damage will not occur from once-through cooling. This is especially true under circumstances where no prior definition of ecological damage has been proffered, let alone accepted by the scientific community, and where the technical questions are not distinguished from political ones.

We would restate the words in the introduction of the committee's report about the behavior of waste heat:

> "Unlike many other waste problems, there is limited concern about persistence or buildup in the water environment or other biological magnification (such as with toxic substances) or about a direct effect upon the health or safety of man. The amount of waste heat in a body of water is always in equilibrium with the atmosphere and cessation in input will result in an almost immediate return to the natural temperature regime. The behavior of waste heat in Lake Michigan is also significantly different than it is within the predictable confinement of a flowing stream. The committee believes that the above characteristics of the waste heat problem in Lake Michigan are such that they do allow a period of time for the establishment of sensible controls."

Moreover, "the committee believes the assignment of . . . engineering design requirements at this time would be arbitrary and not defensible." These statements hardly support the sense of urgency about controlling thermal discharges that is apparent in the recommendation.

To quote another portion of the introduction:

> "The committee believes that the most important effects of waste heat are local, lying mainly at or very near the heat source. The most obvious effects will be to organisms caught up in tremendous volumes of water passing through cooling facilities and immediately subjected to large temperature rises and other physical stress. Of almost equal importance would be the fate of additional organisms entrained within the plume in the immediate area of the discharge."

This clearly identifies the immediate areas of thermal discharges as exhibiting the first order biological effects. Second and third order effects that could possibly have a significant influence on the Lake's ecology would appear only after local effects could be clearly detected by comprehensive studies. Again, there is no apparent need for urgent regulation providing that localized studies are continued.

The references in the quote to "tremendous volumes of water" and "large temperature rises" are inappropriate without inclusion of the modes of comparison. In some contexts the volumes and temperatures in question are relatively small, as was evidence in data presented at the Chicago Workshop.

Along the line of biological effects the committee also curiously noted, in the introduction, concern over the bottom layering of warm water in the winter. They stated that it "might occur over relatively large areas, having its chief effects on bottom fauna and the disruption of fish reproduction." The question of whether water temperatures in the 40°F range can properly be called warm is certainly debatable, but, because many of the biological studies conducted near the thermal discharges concentrate quite heavily on benthic populations, the effects of such a phenomenon should be among the first to be detected.

This recommendation in particular should be entirely ignored.

5. "The committee further recommends that in-depth field and laboratory studies to determine the effects of the ecology be conducted under the guidance of a technically competent steering committee appointed by the Lake Michigan Enforcement Conference. The studies should determine the physical and biological effects on Lake Michigan of heated discharges from thermal electric power generating facilities and the effects on organisms in the cooling water passing through these facilities."

COMMENT: Consumers Power Company agrees with these recommendations and has supported all reasonable efforts in this regard. For example, Consumers Power Company is engaging in comprehensive site studies and has joined with other utilities serving areas adjoining Lake Michigan in sponsoring a broad inventory of Lake conditions. Should thermal discharges be arbitrarily restricted, however, any further interest in such efforts would, of course, be limited.

6. "The committee recognizes that facilities with once-through cooling may possibly be designed to avoid ecological damage by:

(a) Discharging far enough offshore to prevent the thermal plume from reaching the shoreline.

(b) Designing the discharge structure to prevent the thermal plume from reaching the Lake bottom.

(c) Designing plant piping and pumping systems to minimize physical damage to entrained aquatic organisms."

COMMENT: In any event, the "ecological damage" sought to be avoided is conjectural at this time. Further, the committee reported that it "considered inadvisable to recommend the imposition of specific engineering requirements for cooling or discharge systems which would possibly appear inadequate or damaging in themselves in a few short years."

Furthermore, definitions of ecological damage and quantifications of relative effects are essential for proper evaluation of such alternatives. It is known, however, that the nature of such systems cannot be duplicated in the laboratory or with small-scale experiments. It is essential, therefore, for plants employing such systems to operate in order to quantify relative environmental and ecological effects.

7. "The committee recommends that geographic areas affected by thermal plumes from artificial waste heat discharges not overlap or intersect."

COMMENT: This recommendation is also based on the unwarranted assumption that in the absence of evidence to the contrary all electric generating plants' thermal discharges are harmful to the Lake's ecology. If one is bad, therefore, two must be worse, especially if they overlap. Moreover, such a determination cannot be made devoid of facts about specific site conditions including the size and character of the thermal plumes and, at least, the potential adverse effects. There is no theory or evidence presented to suggest that overlapping plumes would cause a reenforcement of effects or otherwise might be harmful.

8. "The committee recognizes the possible detrimental effect on various aquatic organisms resulting from the use of chlorine or other chemicals in the cooling water. The committee recommends that all new power facilities using Lake Michigan water be required to incorporate mechanical cleaning rather than chemical into plant design. All existing facilities should be required to install mechanical cleaning devices on condensers as improvements or modifications are made to equipment."

COMMENT: This recommendation is not founded upon any information or research about which Consumers Power Company is aware. Certainly no evidence introduced at the Enforcement Conference Workshop supports the recommendation. It is submitted that this recommendation must be ignored or evidence must be presented and subjected to critical examination.

The recommendation is especially curious in view of the requirement in Michigan that all municipal sewage treatment plant effluents must now be chlorinated all year around, without regard to potential water uses. For comparison purposes, a city as small as Jackson, Michigan discharges chlorine in excess of 80,000 lbs per year while the J. H. Campbell Plant, Consumers largest plant now operating on Lake Michigan, typically discharges about 50,000 lbs in a year's time.

9. "The committee has limited evidence that there may be physical damage to phytoplankton, zooplankton and fish at intake structures and during the pass through the cooling system. The committee anticipates that studies will demonstrate damage to the above organisms and therefore recommends that future intake structures be designed and located to minimize entrainment and thus avoid possible destruction of these organisms."

COMMENT: Consumers Power Company agrees that physical damage to aquatic organisms can occur by virtue of an intake system and/or passage through a plant's cooling system. It is further agreed that a worthy goal would be to design to reasonably minimize this damage at the various plants, even though it may not be of ecological significance. The Company is conducting studies and would support legitimate research relative to this matter. Previous plant designs have not ignored this factor even though no significant ecological damage has been demonstrated. The Palisades Nuclear Plant intake, for instance, was designed offshore, to minimize vertical velocities that might attract fish, and horizontal velocities near the bottom, that might draw in bottom dwelling organisms. A relative high temperature rise was also utilized in the plant design, that effectively minimizes the amount of water passed through the system.

10. "The committee has concerned itself with the loss of benthos, phytoplankton, zooplankton, and fish through the intakes of various industrial and municipal water supplies. The committee suggests that each State conduct studies under the guidance of the technical steering committee of the passage of organisms into these facilities to determine if there is a significant loss."

COMMENT: Consumers Power continues to support such studies in hopes that the unresolved technical issues may be clarified prior to the establishment of unnecessary and costly restrictions on existing and future discharges.

11. "The committee recommends that all thermal generating facilities be required to record intake and discharge flows and temperatures continuously and to make these records available to the regulatory agency upon request."

COMMENT: Consumers Power Company has for many years provided such information to the Michigan Water Resources Commission and will continue to do so. This procedure has been followed in the interest of increasing the amount of information available on which intelligent determinations of the ecological impact of this use of water can be made.

CONCLUSIONS:

The technical committee cannot be faulted too much for their inability to recommend, as they were specifically directed, "suitable numerical limits to be included in the (latest federal) proposal." A similar situation would prevail with regard to other control concepts, as was so well stated by the committee in the introduction, as follows:

> "The committee recognizes the value of receiving water temperature standards, but since there has been no demonstrated significant damage at existing Lake Michigan thermal plume sites from artificial heat inputs, the assignment of numerical effluent values or other engineering design requirements at this time would be arbitrary and not defensible."

Indeed, the specific recommendations of the committee for controls are arbitrary and not defensible from either a technical or legal standpoint.

Consumers Power Company has made known its position regarding the establishment of regulations concerning thermal discharges in the past. In summary, we believe a proper philosophy and course of action would be as follows:

There are very real and/or pressing problems related to conserving energy resources, meeting electrical demands, assuring electrical system reliability, environmental effects of cooling facilities, and conserving or properly apportioning societies financial resources. The principles of ecology, and indeed the philosophy of the National Environmental Policy Act, demand that Federal actions impinging on the environment must consider all identifiable effects. Accordingly, decisions on such matters should be consistent with established governmental priorities and based on obvious and proven effects. None of the currently proposed restrictions on thermal discharges into the Great Lakes meet this test. Based on the evidence, the only course of action we see that will satisfy these requirements would be for the regulatory agencies to:

1. Initiate whatever field and laboratory studies are necessary to thoroughly evaluate effects of thermal discharges.
2. Allow all existing and planned power projects to operate as designed.
3. Catalog and periodically review the data associated with the various studies.

As direct environmental effects of thermal discharges may be identified, the agencies should then make a determination of their significance, as compared to effects of alternatives on the environment, energy supply, etc. In the context of these evaluations, restrictive regulations could be promulgated, if necessary, with due regard for all pertinent factors. Such a procedure, if conducted comprehensively, and with dispatch, would provide for discovery and clarification of what are now largely imaginary issues, and remove the standard setting process from the existing aura of unnecessary urgency and capriciousness.

JZR

3/18/71

MR. STEIN: Mr. Frangos.

MR. FRANGOS: Yes, Mr. Chairman, I have a statement of the Wisconsin Power and Light Company, and I would like to submit that for the record. I only have two copies and I would like to have this distributed to the conferees tomorrow if the Federal conferees would like this.

MR. STEIN: Let's wait for a moment. Do we have a machine here?

MR. FRANGOS: Do they all have that?

Oh, they all have that? You have got it anyway. Okay. Fine. And the court reporter has a copy?

MRS. HALL: Not yet.

MR. STEIN: Let's not let this fall in the cracks. Is that taken care of, Glenn?

MR. PRATT: Yes.

MR. STEIN: It is all reproduced?

MR. PRATT: Yes.

MR. FRANGOS: I think the reporter does not have a copy.

MR. STEIN: Right.

MR. FRANGOS: Okay. Very good.

Mr. Stein, the hour is late, and we need to let the reporter --

MR. STEIN: That is right.

MR. FRANGOS: -- go home. But I couldn't help but note that -- unless I am mistaken -- Consumers Power is a subsidiary of the Indiana-Michigan Power Company -- that we did not follow strictly the procedures, and I think it is somewhat unfortunate that the Wisconsin Public Service Corporation could not make the presentation but that this will be made tomorrow morning.

(The statement of the Wisconsin Power and Light Company follows in its entirety.)

STATEMENT OF
WISCONSIN POWER AND LIGHT COMPANY

My name is Paul Keshishian. I am the Director of Power Production of Wisconsin Power and Light Company.

I submitted a statement at the previous session of this conference in which I detailed the Company's operations and its interest in this proceeding by reason of its fossil fueled Edgewater Generating Plant at Sheboygan and its part ownership in the nuclear generating plant at Kewaunee, Wisconsin. I want to respond to the recommendations of the conference Technical Committee on thermal discharges to Lake Michigan.

The Committee has concluded that studies conducted at Lake Michigan plume sites have been inadequate to thoroughly assess the possible effects and implies that further studies be carried out. Wisconsin Power and Light Company agrees with the need for additional studies and desires to participate in those studies. We would suggest that such studies be a coordinated study on a cost-sharing basis. We would hope that the scientists who will assess the possible affects will exhibit some mutual credibility so that their final conclusions can be accepted by all concerned.

The Committee has concluded that dissipation of waste heat may be damaging to the ecology of the lake and that local adverse effects may be corrected by the reduction of the use of Lake Michigan waters for waste heat dissipation. Wisconsin Power and Light Company believes that such a conclusion may be overbroad and may provide the basis for a determination that would prohibit industrial use of the waters. It is clear that any water utilization will have some effect on organisms in the water. We would suggest, therefore, that use of the waters for heat dissipation be reduced only where significant ecological damage occurs.

The Committee has concluded the discharges from controllable sources other than electric generating plants are relatively small and do not require control measures at this time. We would like to refer the conference to the booklet "Thermal Impacts to the Great Lakes 1968-2000" of H. G. Acres of Niagara Falls Ontario, which indicates that thermal discharges from sewage plants and steel plants especially in the Chicago area are greater than those of electric generating stations. Many chemical and steel plants have their own electric generating facilities which discharge waste heat into the lake. We believe it inappropriate to single out the utility industry for this kind of treatment. More important, we believe that if there is damage to the lake ecology by the discharge of waste heat and if it is the objective of the conference to correct such damage by reducing the use of the lake for waste heat dissipation, then all who use the lake for such purpose should be subjected to the same controls.

In response to the recommendations in paragraph 4, we believe that this recommendation casts too severe a burden upon the utility industry. The test of a conclusive showing of no damage is one almost impossible to meet. Having in mind that industrial use of water is a legitimate use, we believe that the extra cost involved in the installation of cooling towers is justified only if more than minimal damage is involved. We suggest that the paragraph read:

> 1. The committee, therefore, recommends that all thermal electric power generating facilities using or planning to use Lake Michigan water for dissipation of artificial waste heat be required to have closed cycle cooling systems, or such other techniques as may be approved by the Lake Michigan Enforcement Conference, under construction by a date considered reasonable and appropriate by the Conferees, unless a reasonable showing has been made to the Lake Michigan Enforcement Conference that significant ecological damage does not or will not occur from once-through cooling.

Wisconsin Power and Light Company fully agrees with paragraphs 5 and 6.

In response to paragraph 7, it should be pointed out that the mere fact that plumes overlap or intersect is not significant but rather it is the effect of such overlapping or intersecting that is significant. We would suggest that the recommendation provide that the overlapping or intersecting of plumes be prohibited where they result in a total heat rate of such a degree as to cause significant ecological damage.

Paragraph 8 deals with chemical discharges from future generating stations. The purpose of the conference was to investigate thermal discharges into Lake Michigan. We do not believe it appropriate to make recommendations on a subject which has not been thoroughly investigated and evaluated. If, however, the problem is of such nature to require control at this time, then we would suggest that similar controls be imposed upon the sewage treatment plants, chemical plants and steel companies emitting wastes into the waters of Lake Michigan or tributaries thereto.

In response to paragraph 9, Wisconsin Power and Light Company is always willing to redesign its equipment if it performs some justifiable purpose and is economically realistic. We believe that research will enable utilities to minimize entrainment and, in general, agree with this paragraph.

Wisconsin Power and Light Company is in full agreement with paragraph 10.

Wisconsin Power and Light Company believes that through a combined effort the thermal emission problem will be solved and is more than willing to supply intake and discharge information as required in paragraph 11.

It is through the collection and distribution of all knowledge that we will be able to meet this ultimate goal.

In conclusion, Wisconsin Power and Light Company believes that the question of the appropriate temperature limitation for waters discharged into Lake Michigan involves the balancing of the interests of all sectors of the public in the use of Lake Michigan. Wisconsin Power and Light Company again submits that a 5° F. limitation at the boundary of a reasonable mixing zone coupled with constant monitoring of the discharge waters with appropriate remedial action when any actual harm is detected does represent an appropriate balancing of those interests.

MR. STEIN: All right. We are going to try to give everyone his due. Now, the way I view these things, is that we all have to keep our obligation on this and give you a very fair due.

The State and Federal officials here, of course, have to stay around until the last dog is hanged on these operations. We also must recognize that the people who come here do so at their own expense and on their own time. We also realize that industry has taken time out in coming here, and although these people are getting paid, we recognize they have other commitments and have to get along. We are trying to do our best to juggle our schedule to give everyone an opportunity to be heard. We will hear everyone certainly before we go into Executive Session. At this time we will stand recessed until 9:00 o'clock tomorrow morning. We have another room. What is that room?

MR. PRATT: Randolph Room.

MR. STEIN: Where is that?

MR. PRATT: Lower level.

MR. STEIN: Lower level, Randolph Room.

(The conference adjourned at 5:35 p.m.)

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